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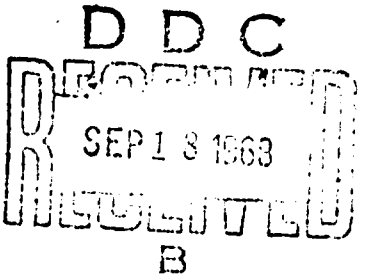

DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland

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THE INFLUENCE OF SALT ON METABOLISM IN PNEUMONIA CASES

[Following is the translation of an article by Dr. W. v. Moraczewski of the medical clinic of Prof. A. Gluzinski in Lemberg in the German-language publication Zeitschrift fur klinische Medizin (Periodical of Clinical Medicine), No 39, 1900, pages 44-92.]

In one of my earlier articles dealing with secretion and fever, I had attempted to show that secretion which accompanies fever might well be influenced by circulation.

This article is based on study of several cases of typical pneumonia in an attempt to determine whether circulatory disturbances could be influenced by artificial means and the degree of water retention could be inhibited. I was of the opinion that imbibition along caused the decomposition of albumen. Consequently, the addition of water should increase both the imbibition and decomposition. Since the decomposition of albumen was bound to cause fission of the albumen cell and the multiplying of cells in general, a further result would be the increase of osmotic pressure and the imbibition of water by the decomposed organs. This process should continue until the cellular concentration of the organs corresponded to that of the blood.

The subsequent course may be pictured as follows: after the crisis (which might abate the irritable condition through the dilution of lymphs) the water is wrung out of the tissue as if it were a sponge. Having passed through the kidneys, it appears in the form of urine laden with decomposition products.

The purpose of my experiment was to determine whether the separation of salt from the blood would successfully decrease imbibition on the part of the tissue, or whether

additional water would add to the decomposition process. Grawitz had proved that the intake of common salt initially increased the concentration of blood which later sank below the norm (Zeitschr. f. klin. Med., No 22, p 411). This means that at first salt attracts water from the blood, afterwards settles in the blood and draws water from the tissue into the blood. A similar process was said to take place in the feverish organism. If one could succeed in diluting the blood at the cost of the organs, then it should be possible to inhibit imbibition and its decomposing effect.

(Our attempt to decrease imbibition should not be confused with circulatory disturbances or anemia of the organs. As shown in Samuel's tests, inflammation worsens in anemic cases and the inflamed areas become necrotic. It is commonly known that pneumonia cases which fail to retain chloride and secrete a small amount of phosphate usually terminate in death.)

Another way of testing our opinion was through mineral salts which lead to the concentration of blood. The choise of salts was limited to those which form an integral part of the organism and appear to be of particular importance during fever. These were common salt (6 g and 10 g per day) and calcium phosphate (10 g per day). They were given individually and mixed (5 g of each per day). In addition, in special cases 100 to 110 g of sugar was given -- a dosage which osmoticly equals 10 g of common salt. Nucleic acid, silver nitrate, and potassium chloride were each given once. The inhalation of oxygen was applied once.

We were interested in studying not only imbibition, but also the influence of various agents on the feverish organism. The experiment constantly gave rise to new problems which needed to be clarified. As a result the work had to be limited in order to avoid too extensive involvement. Nevertheless, in addition to the above mentioned problem, the following aspects have been included: 1. the influence of sugar on the decomposition of albumen; 2. the influence of additional nitrogen on the decomposition of albumen; 3. the influence of water and salt; 4. calcium secretion during fever.

Formerly tested methods were used during our experiment. A mixture of urine collected during 24 hours was tested. The oxygen was tested according to Kjeldahl's method. Testing methods outlined in Huppert's text were applied to

phosphate, chloride, calcium, ammonia, and so forth. Every fresh sample of feces was examined. Kjeldahl's method was applied to nitrogen. Chlorine, phosphorous, and calcium were determined according to our methods. A solution of 1/10n of silver nitrite was added to the feces, and it was decomposed with fuming nitric acid through boiling and evaporating. A non-specific amount of silver was titrated with potassium rhodanide to determine the chlorine. Silver nitrite was not used to determine phosphorous and calcium. Phosphorous was precipitated with ammonia molybdate, and calcium -- with ammonium combined with oxalic acid. The ingredients in question contained in the food were determined in the same manner.

A particularly careful analysis was made of the feces during every period. Usually the examination consisted of two periods: one before, and one after the crisis. If the diet changed (usually due to increased appetite of the patient), the period after the crisis was divided into two parts, corresponding to the changes in nourishment. The sample to be analyzed was taken from the entire feces mixed to a paste.

The patients' diet was determined by their needs. The intake of fluids was controlled only in exceptional cases. Usually the intake was probably greater than indicated.

The tables were set up following an increase of nitrogen in the food.

All tables show the increased quantity of salt. The result column contains two figures in each case. One shows the result without the artificial addative, the other with the artificial addative. A retention may naturally be expected after adding 10g of common salt. The double calculation was made to show whether the entire quantity of additional salts was retained, or whether a portion of it was eliminated.

CASE I.

S. W., 23 years old. Pleuropneumonia sinistra.

Anamnesis.

Nothing of great importance. The illness broke out one week ago with the typical symptoms.

Status praesens.

Nothing of importance to be found in patient except for the changes in the lungs. Patient is not conscious at all times. In spite of digitalis and coffein, death occurs three days later. During this time 150 g of sugar were added to the patient's regular diet. The daily diet consisted of tea, soda water, and wine (without N). The patient's involuntary bed-wetting during the first day restricted our ability to take adequate samples. The observation lasted two days. There was no bowel movement. The urine was analyzed daily. The blood test showed the following results:

5.210000 red corpuscles, 15313 white corpuscles,
97% hemoglobin.
91.5% multi-granular white corpuscles;
0.5% small, 4.0% large lumphocites;
4% transitional forms, 0 eosinophile.

The diet consisted of 1000 ccm tea,
250 ccm wine.
1600 ccm soda water,
150 g cane sugar.

2850 g liquid.

Temperature fluctuated between 39 and 38; the pulse was 112. The post mortem examination confirmed the diagnosis.

a) Datum. Temp. Puls.	b) Procent-Gehalt.	c) Harn-menge.	d) Ausgaben e) Harn.	f) Koth.	g) Nahrung.	h) Resultat.	i) Wasser.
15. III.		1000					
39,3	N 1,9705	ccm	19,705	—	—	−19,705	
39,4	Cl 0,0319		0,319		0,7952	+ 0,476	2850
39,2	P 0,0633		0,633		—	− 0,633	ccm
P. 110	Ca 0,0026		0,261		0,7236	+ 0,6975	
16. III.		1000					
39,1	N 1,9845	ccm	19,845	—	—	−19,845	
39,0	Cl 0,0533		0,533		0,7952	+ 0,262	2850
39,3	P 0,1537		1,537		—	− 1,537	ccm
P. 112	Ca 0,0095		0,0954		0,7236	+ 0,6282	
j) Nahrung 2850 ccm Wasser:			— g N		0,79 g Cl	— g P	0,72 g Ca
k) Verhältnise:			:		1	:	1
l) Ausscheidung 1000 H_2O:			19,77 g N		0,42 g Cl	1,08 g P	0,06 g Ca
Verhältnise:			329	:	7	: 18	: 1
m) Resultat:			−19,77 g N		+0,37 g Cl	−1'08 g P	+0,66 g Ca
+1850 ccm Wasser:			—		+ 45 pCt.	—	+ 90 pCt.

[Legend:] a) date, temperature, pulse; b) content %; c) urine amount; d) excretion; e) urine; f) feces; g) nourishment; h) result; i) water; j) nourishment, water;

k) ratio; l) secretion; m) result.

CASE II

M. J., 37 years old. Pleuropneumonia fibr. sinistr.

Anamnesis.

Patient has little knowledge of his previous life and family. The illness broke out two days ago.

Status praesens.

Except for the changes in the lung, no signs of disease to be found in the internal organs. Patient highly delirious. Before the crisis, the temperature does not exceed 39°, the pulse 112 to 90. After the crisis, the temperature was 35.7° to 37°, the pulse 70 to 80. In addition to the liquid diet consisting of milk and bouillon, the patient was given 5.0 g calcium phosphate and sodium chloride. Later the salt was discontinued.

The diet consisted of the following:

400 ccm milk,
1000 ccm wine,
1500 ccm water
2900 ccm fluid

a) Datum.	b) Procent-Gehalt.	c) Harn-menge.	d) Ausgaben e) Harn.	f) Koth.	g) Nahrung.	h) Resultat.
		ccm				
25. Jan.	N 1,750	1000	17,5000		2,4080	—16,450
	Cl 0,1153		1,1529		0,5340	— 0,672
	P 0,0316		0,3164		0,3836	— 0,535
	Ca 0,0010		0,0100		0,5440	— 0,442
26. "	N 1,680	1230	20,664	Cl 0,0434 g	2,4080	—19,614
	Cl 0,0546		0,6706	Ca 0,9763 g	0,5340	— 0,180
	P 0,0572		0,7038		0,3836	— 0,922
	Ca 0,0018		0,02204		0,5440	— 0,454
27. "	N 1,746	1050	18,3330		4,8160	—14,875
	Cl 0,0643		0,6754	N 1,353 g	1,0650	+ 0,350
	P 0,0417		0,4383	P 0,6620 g	0,7672	— 0,273
	Ca 0,0012		0,0126		0,0880	+ 0,100
28. "	N 1,6100	1800	28,980		4,8160	—25,522
5 g NaCl	Cl 0,2002		3,6036		1,0650	— 2,579 (+ 0,450)
5 g $Ca_3(PO_4)_2$	P 0,0572		1,0299		0,7672	— 0,865 (+ 0,145)
	Ca 0,0010		0,0180		0,0880	+ 0,094 (+ 2,000)

[continued on next page]

			ccm				
29. Jan.	N	1,708	850	14,518	N 1,358 g	4,8160	−11,060
	Cl	0,1218		1,0411	Cl 0,0134 „	0,0680	+ 0,006 (+ 3,037)
do.	P	0,0894	„	0,7599	P 0,6720 „	0,7672	− 0,0947 (+ 0,406)
	Ca	0,0010		0,0085	Ca 0,9763 „	0,0880	+ 0,104 (+ 2,000)
30. „	N	1,635	1500	15,575		7,5400	−10,927
	Cl	0,4429		7,1455		2,524	− 4,856 (+ 1,822)
do.	P	0,0525		0,7876	Cl 0,2369 g	0,7410	− 0,833 (+ 0,162)
	Ca	0,0010		0,0015	Ca 1,0103 „	1,1350	+ 0,124 (+ 2,000)
31. „	N	0,511	2000	10,2200		12,145	− 0,955
	Cl	0,4247		8,4052		5,007	− 3,635 (− 0,571)
do.	P	0,0309		0,6192		1,4716	+ 0,063 (+ 1,064)
	Ca	0,0003		0,0060		1,6945	+ 0,678 (+ 2,000)
1. Febr.	N	0,801	3100	9,3810	N 2,8888 g	16,689	+ 4,420
	Cl	0,224		6,5950	Cl 0,2369 „	5,2519	− 1,380 (+ 1,454)
do.	P	0,0179		0,5655	P 0,7925 „	1,5081	+ 0,210 (+ 1,064)
	Ca	0,0018		0,0558	Ca 1,0101 „	1,725	+ 0,659 (+ 2,000)
2. „	N	0,4865	2050	9,9732	N 2,8888 g	21,204	+ 8,343
	Cl	0,4798		9,8356	Cl 0,2369 „	6,8328	− 3,220 (− 0,195)
do.	P	0,0414		0,8489	P 0,7925 „	1,6585	+ 0,117 (+ 1,064)
	Ca	0,0017		0,0340	Ca 1,0101 „	1,7820	+ 0,738 (+ 4,000)
3. „	N	0,4421	1700	12,614		21,743	+ 8,028
	Cl	0,3551		7,6367	Cl 0,4363 g	6,3692	+ 1,765 (+ 1,326)
do.	P	0,0673		1,1454	Ca 0,433 „	1,5757	+ 0,056 (+ 1,064)
	Ca	0,0036		0,0612		1,7580	+ 1,269 (+ 3,000)
4. „	N	0,9735	1200	11,6820		18,571	+ 5,088
	Cl	0,6432		7,7184	Cl 0,4363 g	6,636	− 1,162 (+ 1,872)
do.	P	0,0509		1,0906	Ca 0,433 „	1,5862	+ 0,237 (+ 1,064)
	Ca	0,0071		0,0859		1,7800	+ 1,256 (+ 2,000)
5. „	N	0,679	1900	12,901		29,077	+ 4,976
	Cl	0,4247		8,0793	N 1,261 g	6,5231	− 1,983
	P	0,0565		1,0644	P 0,8442 „	1,5712	+ 0,103
	Ca	0,0046		0,0882		1,761	+ 1,285
6. Febr.	N	0,9705	1400	13,071		16,3120	+ 0,159
	Cl	0,5097		7,1358	P 1,2952 g	6,0389	− 1,155
	P	0,0834		1,1686		1,6015	− 0,8628
	Ca	0,0088		0,1222		1,755	− 0,602
7. „	N	0,8995	2000	17,9901		20,843	+ 0,376
	Cl	0,4247		8,494		6,8052	− 1,746
	P	0,0606		1,2129		1,7892	− 0,718
	Ca	0,0098		0,1971	Cl 0,05796 g	1,8050	− 0,627
8. „	N	0,991	1800	16,038	Ca 2,835 g	19,874	+ 1,340
	Cl	0,540		9,428		7,881	− 1,604
	P	0,0483		0,7692		1,827	− 0,237
	Ca	0,0085		0,158		1,776	− 0,619
9. „	N	0,700	2100	15,05		21,354	+ 3,808
	Cl	0,4672		9,8112		8,210	− 1,650
	P	0,0436		0,9154		1,729	− 0,481
	Ca	0,0086		0,1848	N 2,4962 g	1,824	− 0,594

		g N	g Cl	g P	g Ca
1. Periode.	9 Tage.				
5900 H_2O	Nahrung: ⓐ	9,408	0,554	0,384	0,544
	Verhältnisz: ①	4,7	1	0,7	1
1100 H_2O	Ausscheid.: ④	20,44	0,96	1,11	1,00
	Verhältnisz:	20,4	0,9	1,1	1
+1900 H_2O	Retention: ⑤	−18	− 0,48	− 0,78	− 0,44
in pCt. d. Aufnahme	⑥	−750	− 90	− 290	− 80

[continued on the following page]

II. Periode. 3 Tage.		g N	g Cl	g P	g Ca
			4,136	1,767	3,083
2500 H_2O	Nahrung:	4,816	1,065	0,767	1,083
	Verhältniss:	4,7 (1,6)	1 (1,3)	0,7 (0,5)	1 (1)
1200 H_2O	Ausscheid.:	21,96	1,81	1,34	0,98
	Verhältniss:	22,0	1,7	1,4	1
+1300 H_2O	Retention:	−17,15	− 0,75 (+3,32)	− 0,58 (+0,42)	+ 0,1 (2,00)
in dCt d.	Aufnahme:	−350	− 74 (+80)	− 83 (26)	+ 10 (70)

III. Periode. 6 Tage.		g N	g Cl	g P	g Ca
2300 H_2O	Nahrung:	16,31	5,78 (+3)	1,43 (+1)	1,64 (+2)
	Verhältniss:	10 (4)	3,6 (2,5)	0,9 (0,6)	1
Ausscheid.	Harn:	11,52	7,88	0,84	0,04
2000 H_2O	Koth:	2,32	0,29	0,64	0,82
		13,84	8,17	1,48	0,86
	Verhältniss:	16	9,0	1,6	1
+300 H_2O	Retention:	+ 2,47	− 2,39 (+0,61)	− 0,05 (+1)	− 0,78 (+2,78)
in pCt. d.	Aufnahme:	+ 15	− 47 (+8)	− 4 (+70)	+ 40 (+80)

IV. Periode. 5 Tage.		g N	g Cl	g P	g Ca
2000 H_2O	Nahrung:	19,45	7,09	1,70	1,76
	Verhältniss:	11	4,0	1	1
Ausscheid.	Harn:	15,10	8,51	1,02	0,15
1600 H_2O	Koth:	2,49	0,06	1,29	2,33
		17,59	8,57	2,31	2,48
	Verhältniss:	7	3,6	1	1
+800 H_2O	Retention:	+ 1,86	− 1,46	− 1,61	− 1,70
in pCt. d.	Aufnahme:	10	20	90	90

[Legend:] a) date; b) % content; c) urine amount; d) excretion; e) urine; f) feces; g) nourishment; h) result; i) period - days; j) ratio; k) secretion; l) excretion; m) in % of intake; n) urine; o) feces.

The time of observation was divided into four periods: the first two during the fever, the last two following the crisis.

The patient took very little nourishment during the first period, so that more matter was secreted by the organism than taken in. Every 100 g of nourishment contained 22 g chlorine, 16 g phosphorous, and 25 g calcium. The excretion contained 4.8 g chlorine, 5.5 g phosphorous, and 5 g calcium, showing a relative chlorine and calcium retention.

The patient was given 5 g sodium chloride and 5 g calcium phosphate, whereby all chlorine and calcium were retained. A portion of the phosphorous was retained by the organism as well. The loss of nitrogen had diminished considerably. This time the loss was three times as great as the intake, while during the first period the loss had been seven times greater. Calcium was retained in greater quantities than any of the other components, chlorine and phosphorous -- the least.

The third period showed a retention of nitrogen in addition to chlorine, phosphorous, and calcium. Of all the salts only calcium was retained in its entirety; part of the chlorine and phosphorous were eliminated. Relatively speaking, it cannot be denied that chlorine is the major component secreted.

The patient was put on a salt-free diet during the fourth period. In spite of the increase in the food intake, a lower retention of nitrogen may be noted. Either the salt had been instrumental in retaining nitrogen, or the organism had not been ready as yet to cope with the intake. The latter is hardly probable. In any case, at this point we see a conserable secretion of chlorine, phosphorous, and calcium, which had not been secreted by the organism until now.

The secretion shows a significant ratio of nitrogen to phosphorous, a gradual decrease from 20:1 to 10:1 to 7:1. The feces showed a ratio of calcium to phosphorous 3:2 before the crisis, and 2:1 after the crisis.

It should be noted that in spite of the additional dosage of calcium phosphate, the feces showed no increase in calcium. Consequently, almost the entire calcium phosphate had been re-absorbed.

CASE III

S. W., 29 years old. Pneumonia fibrinosa.

Anamnesis.

Patient comes from a healthy family. Is supposed to have suffered from pneumonia ten years ago. Had been bed-ridden for three weeks. Current complaint began five days ago on 20 May. Patient fell ill showing the typical symptoms.

Status praesens.

Auscultation shows bronchial breathing. There is a damping in the right lung region. Other organs show no abnormalities. The blood contains 80% hemoglobin, 3.800000 red and 15312 white corpuscles. Patient placed on liquid diet with a dosage of 5 g potassium chloride which corresponds to 2.382 g chlorine.

Temperature first 39°, then 36°. Pulse first 100, then 60.

The diet consisted of the following:

350 ccm milk
100 ccm bouillon,
250 ccm wine soup with egg,
250 ccm wine,
1600 ccm syphon

2500 ccm liquid

Datum. Temp. Puls.	Procent-Gehalt.		Harn-menge. ccm	Ausgaben. Harn.	Koth.	Nahrung.	Resultat.	Wasser.
26. Mai	N	1,080	970	10,296		2,691	— 15,642	2500
39.2	Cl	0,0710		0,6887		1,775	+ 1,088 (+ 2,86)	
100	P	0,07956		0,7695		0,824	+ 0,965	
5 g KCl	Ca	0,0026		0,0252		0,766	— 0,561	
27. Mai	N	1,845	1130	20,8824	0,0239 g N 1,137 g Cl	3,540	— 17,679	3000
38.8	Cl	0,0958		1,0825		2,850	+ 1,720 (+ 2,88)	
84	P	0,0793		0,8961		1,105	+ 0,009	
5 g KCl	Ca	0,0018		0,0204		0,989	— 0,237	
28. Mai	N	1,894	600	11,364	0,0196 g P 1,1021 g Ca	2,655	— 10,146	2300
37,1	Cl	0,1891		1,1346		1,970	— 9,107 (+ 2,28)	
68	P	0,1323		0,7938		0,5793	+ 1,034	
5 g KCl	Ca	0,0030		0,0180		0,7771	+ 0,553	
29. Mai	N	2,282	880	20,0816		3,0460	— 17,878	1200
36.6	Cl	0,071		0,6248		1,0980	+ 0,415 (+ 2,38)	
60	P	0,2046		2,3285		0,7709	— 2,877	
5 g KCl	Ca	0,0016		0,0136		0,7292	— 0,407	
30. Mai	N	1,880	800	15,120		5,1961	— 11,361	1100
36,0	Cl	0,2343		1,8744		0,9730	— 0,903 (+ 1,46)	
46	P	0,2934		2,3592		0,8776	— 2,292	
5 g KCl	Ca	0,0040		0,0320		0,6904	— 0,534	
31. Mai	N	1,526	820	14,0392	0,0304 g N 0,614 g Cl	5,5880	— 9,350	1300
36.3	Cl	0,3372		3,1012		1,0683	— 2,021 (+ 0,36)	
64	P	0,2838		2,6109		2,1067	— 1,677	
	Ca	0,0055		0,0500		0,9014	+ 0,150	
1. Juni	N	1,176	1170	13,7592	0,0238 g P 0,6936 g Ca	8,166	— 6,487	1200
35.8	Cl	0,2840		3,3223		2,888	— 0,440 (+ 1,94)	
68	P	0,1052		1,2308		1,1367	— 0,517	
	Ca	0,0060		0,0702		0,7597	— 0,001	
2. Juni	N	1,554	820	12,7428		11,647	— 1,988	2000
36.2	Cl	0,3195		2,6199		5,3756	+ 2,756 (+ 2,88)	
60	P	0,1750		1,4424		1,7873	— 0,028	
	Ca	0,0172		0,1400		1,0904	+ 0,251	

[continued on following page]

I. Periode. 4 Tage.	g N		g Cl		g P		g Ca
2300 H_2O Nahrung:	2,98		1,68		0,77		0,81 (4,06 Cl)
Verhältniss:	3,6	:	2	:	0,9	:	1 : 5
900 H_2O Harn:	17,15		0,85		1,19		1,019
Ausscheid. Koth:	1,44		0,03		0,82		1,102
	18,59		0,88		2,01		1,12
Verhältniss:	16,8	:	0,8	:	1,8	:	1
+ 1400 H_2O Retention:	— 15,61		+ 0,80		— 1,24		— 0,31 (+ 3,18 Cl)
in pCt. der Aufnahme:	— 500		+ 50		— 170		— 40 (+ 80 pCt.)

II. Periode. 4 Tage.	g N		g Cl		g P		g Ca
1400 H_2O Nahrung:	7,65		2,58		1,23		0,89 (4,96 Cl)
Verhältniss:	8,5	:	2,9	:	1,50	:	1 : 5,6
900 H_2O Harn:	13,52		2,60		1,96		0,73
Ausscheid. Koth:	0,83		0,01		0,37		0,70
	14,81		2,61		2,27		1,43
Verhältniss:	10	:	1,7	:	1,6	:	1
+ 500 H_2O Retention:	— 7,16		— 0,03		— 1,04		— 0,54 (+ 2,35 Cl)
in pCt. der Aufnahme:	— 90		— 1		— 89		— 60 (+ 40)

[Legend:] a) date, temperature, pulse; b) % content; c) Amount of urine; d) excretion; e) urine; f) feces; g) nourishment; h) result; i) water; j) period - day; k) nourishment; l) ratio; m) urine; n) feces; o) excretion; p) % of intake.

The intake of 5 g potassium chloride in the presence of fever influenced the secretion of phosphorous and calcium, as it is customary for chloride to increase the secretion of phosphorous. The loss of nitrogen was relatively low in spite of the insignificant intake. A relative retention of chlorine and calcium is also to be noted. While the intake contained 50 g chlorine, 22 g phosphorous, and 27 g calcium, the quantities secreted amounted to 5 g chlorine, 11 g phosphorous, and 6 g calcium.

Following the crisis, an intake of 30 g chlorine, 16 g phosphorous, and 12 g calcium, produced an excretion containing 17 g chlorine, 16 g phosphorous, and 10 g calcium. Here too, chlorine and calcium are spared in comparison to nitrogen and phosphorous. The absolute loss of calcium and phosphorous is characteristic of periods without fever as well.

Potassium salt most like caused this considerable bradycardia, which in turn may well be connected with increased secretion. It is known that agents which retard the pulse act as an adjuvant on secretion.

CASE IV

P. S., 30 years old. Pleuropneumonia dextra.

Anamnesis.

Parents and brothers and sisters of patient no longer alive. Patient does not know cause of death. Current illness broke out six days ago with the typical symptoms. Patient felt no piercing pain in his chest. His supposedly been healthy in the past. Led a moderate life.

Status praesens.

Lungs show typical changes. The spleen slightly enlarged and painful. No obvious signs of disease in the other organs.

The blood test showed the following results: 58% hemoglobin, 4,012,500 red and 13,200 white corpuscles; of these 87% multi-granular, 3% large lymphocites, 1% small lymphocites, 9% transitional forms, no eosinophile.

The diet consisted of milk, bouillon, and wine. In addition the patient received 110 g sugar. The feces was collected during the period of examination, one portion preceding, one following the crisis. Urine was of a high specific weight. The temperature and pulse are shown in the table.

The diet consisted of the following:

900	ccm milk
150	ccm bouillon
100	ccm wine
1200	ccm syphon
110	ccm sugar
2300	ccm fluid

In this case the patient received the same diet throughout the testing period. The nitrogen secretion was lower than in other cases where the same amount of nourishment was given. The typical retention of chlorine and calcium had been anticipated in advance. This case was particularly suitable for the study of changes in secretion which are caused by fever. During the fever the bowel excretion showed more NCl, less calcium and phosphorous. The loss of

a) Datum. Temp. Puls.	b) Procent-Gehalt.		c) Harn-menge. ccm	d) Ausgaben e) Harn.	f) Koth.	g) Nahrung.	h) Resultat.
18. März	N	1,6555	1000	16,555		4,8983	− 12,786
40,4	Cl	0,0106		0,106		2,3372	+ 2,172
39,6	P	0,0861		0,851		1,2381	− 0,028
112	Ca	0,0028		0,028		1,2050	+ 1,006
	Mg	0,0044		0,044			
19. März	N	1,0390	1000	19,390		do.	− 15,621
39,2	Cl	0,0421		0,442			+ 1,636
40,0	P	0,1049		1,049			− 0,286
39,6	Ca	0,0011		0,011			+ 1,039
120	Mg	0,0187		0,187			+ 1,040
20. März	N	2,1875	1100	24,062		do.	− 20,393
39,1	Cl	0,0676		0,7436			+ 1,531
39,4	P	0,0786		0,8644			− 0,041
39,5	Ca	0,0008		0,0088			+ 1,048
38,4	Mg	0,0221		0,2432			
116		(max.)			N 1,129 g Cl 0,059 g P 0,4147 g Ca 0,1551 g Mg 0,027 g		
21. März	N	2,2925	870	22,2373		do.	− 18,468
37,0	Cl	0,0166		0,1033			+ 2,228
36,3	P	0,0901		0,8766			− 0,053
38,2	Ca	0,00108		0,0039			+ 1,041
88	Mg	0,0321		0,2144			
22. März	N	2,3100	700	16,170		do.	− 12,179
38,2	Cl	0,0178		0,124			+ 2,184
37,0	P	0,1288		0,902			− 0,361
38,3	Ca	0,0009		0,0063			+ 1,045
37,5	Mg	0,0214		0,1498			
88					N 0,9010 g Cl 0,0293 g P 0,6871 g Ca 0,4432 g Mg 0,0024 g		
23. März	N	2,1155	760	16,0778		do.	− 12,088
37,6	Cl	0,0781		0,5936			+ 1,782
38,0	P	0,1353		1,0286			− 0,487
37,4	Ca	0,0028		0,0165			+ 1,035
88	Mg	0,0218		0,1019			
24. März	N	1,8025	700	13,6175		do.	− 9,848
37,5	Cl	0,2348		1,6401			+ 0,668
37,0	P	0,1441		0,9057			− 0,357
36,8	Ca	0,0081		0,0567			+ 0,995
68	Mg	0,0160		0,1120			
					N 0,9010 g Cl 0,0293 g P 0,6871 g Ca 0,4432 g Mg 0,0024 g		
25. März	N	1,575	870	13,783	do.	4,8983	− 10,014
36,3	Cl	0,3550		3,088		2,3372	− 0,840
36,0	P	0,1353		1,277		1,2381	− 0,726
36,8	Ca	0,0043		0,0374		1,2050	+ 1,014
64	Mg	0,0161		0,1401			

		g N	g Cl	g P	g Ca
I. Periode. 4 Tage vor der Krise.	2300 H_2O Nahrung:	4,69	2,34	1,24	1,21
	Verhältniss:	4 :	2 :	1 :	1
	1000 H_2O Ausscheid. Harn	19,59	0,34	0,90	0,015
	Koth	1,13	0,06	0,42	0,155
		20,72	0,40	1,32	0,170
	Verhältniss:	122 :	2 :	8 :	1
	+ 1300 H_2O Retention:	− 15,83	+ 1,94	− 0,08	+ 1,04
	in pCt. der Aufnahme:	− 300	+ 90	− 7	+ 89
II. Periode. 4 Tage nach der Krise.	2300 H_2O Nahrung:	4,69	2,34	1,24	1,21
	Verhältniss:	4 :	2 :	1 :	1
	700 H_2O Ausscheid. Harn	14,91	1,36	1,21	0,025
	Koth	0,91	0,03	0,68	0,445
		15,82	1,39	1,89	0,46
	Verhältniss:	33 :	3 :	4 :	1
	+ 1600 H_2O Retention:	− 9,95	+ 0,96	− 0,65	+ 0,74
	in pCt. der Aufnahme:	− 190	+ 40	− 60	+ 60

[Legend on following page]

[Legend:] a) date, temperature, pulse; b) % content; c) amount of urine; d) excretion; e) urine; f) feces; g) nourishment; h) result; i) period - days after crisis; j) nourishment; k) ratio; l) secretion; m) urine; n) feces; o) intake.

N amounted to 300%, whereas with the same diet it was only 190% with no fever. There 90% chlorine and calcium were retained, here -- 40%. Cl corresponds to 60% Ca. There we had N:P = 15:1, here 8:1.

In addition to calcium, magnesium was determined in this case as well. It turned out that while calcium decreases preceding the crisis, magnesium is on the rise. Magnesium salts seem to act similarly to phosphorous as opposed to calcium which is closely related to chlorine. Consequently, calcium is eliminated chiefly through the bowels and magnesium through the kidneys.

CASE V

J. A., 22 years old, attendant. 1 February 1899 pleuropneumonia croup. dexter.

Anamnesis.

Patient's patients deceased. Twelve years ago patient suffered from scarlet fever followed by smallpox. Six years ago he suffered from an inflammation of the right lung. He felt completely healthy afterwards. The current illness broke out four days ago with the typical symptoms.

Status praesens.

All organs normal except for the right lung.

The blood shows 84% hemoglobin according to Fleischl; 4,000,000 red and 14,600 white corpuscles; among these 88% multi-granular, 7% small, 2% large, 3% transitional forms.

On 4 February patient received coffein, otherwise he is given 0.3 silver nitrite three times a day. No abnormalities in the urine.

The diet consisted of the following:

250 ccm wine soup,
1000 ccm milk,
500 ccm wine,
800 ccm syphon

2500 ccm liquid

a) Datum. Temp. Puls.	b) Procent-Gehalt.	c) Harn-menge. ccm	d) Ausgaben e) Harn.	f) Koth.	g) Nahrung.	h) Resultat.	i) Wasser.
1. Febr.	N 2,2435	1950	43,7483		5,3774	− 39,392	2500
38,2	Cl 0,0142		0,2769		2,1590	+ 1,879	
39,3	P 0,0969		1,8890		1,1823	− 1,605	
39,6	Ca 0,0009		0,0177		1,5248	− 0,578	
110	NH_3 0,0371		0,7234				
2. Febr.	N 2,4010	1100	26,411	P 0,8361 g	6,6374	− 20,391	6000
39,4	Cl 0,0142		0,1562	Ca 1,8356 „	2,2517	+ 2,111	
38,5	P 0,1073		1,1807		1,4453	− 0,031	
39,0	Ca 0,0010		0,0110		2,1933	+ 0,876	
39,2	NH_3 0,0431		0,5741				
115							
3. Febr.	N 2,2940	940	22,5636	N 1,0176 g	4,1669	− 19,354	2500
38,2	Cl 0,0284		0,2669	Cl 0,0011 „	1,5673	+ 1,597	
39,4	P 0,0716		0,6730		0,8955	− 0,576	
38,6	Ca 0,0011		0,0104		1,1914	− 0,705	
38,5	NH_3 0,0714		0,6712				
120							
4. Febr.	N 2,1806	870	18,9704		5,3774	− 13,847	2400
38,4	Cl 0,0071		0,0618		2,0170	+ 1,953	
38,9	P 0,0899		0,7821		1,1823	+ 0,120	
39,5	Ca 0,0007		0,0069		1,3134	+ 0,544	
39,0	NH_3 0,0469		0,4081				
108							
5. Febr.	N 2,4010	1310	31,4531	P 0,2241 g	5,3774	− 26,330	2400
39,0	Cl 0,0142		0,1860	Ca 0,766 „	2,0170	+ 1,819	
37,0	P 0,1502		1,9676		1,1823	− 1,009	
37,4	Ca 0,0006		0,0078		1,3134	+ 0,548	
37,6	NH_3 0,0437		0,5725				
37,3							
76							
6. Febr.	N 2,4290	800	19,582	N 0,25404 g	do.	− 14,409	2000
36,5	Cl 0,0071		0,0568	Cl 0,0024 „		+ 1,958	
36,8	P 0,1624		1,2992			− 0,341	
36,9	Ca 0,0011		0,0088			− 0,542	
68	NH_3 0,0567		0,4526				
7. Febr.	N 2,3240	1180	27,4232		10,0312	− 16,511	2000
36,5	Cl 0,0639		0,7540		2,7145	+ 1,960	
37,0	P 0,1976		2,3435		1,8161	− 0,806	
36,2	Ca 0,0073		0,0861		1,8369	+ 0,646	
36,3	NH_3 0,0395		0,4657				
76							

[continued on following page]

8. Febr.	N	2,0685	910	18,8234	P 0,2279 Ca 0,0443	do.	— 8,211	2000
36,4	Cl	0,3869		3,5208			— 0,805	
36,2	P	0,2279		2,0750			— 0,556	
36,1	Ca	0,0158		0,1438			+ 0,588	
68	NH_3	0,0326		0,2967				
9. Febr.	N	2,0685	930	18,9116	0,9191 g Spur	11,6190	— 7,679	2000
36,0	Cl	0,4809		4,3561		2,9514	— 1,575	
36,2	P	0,2078		1,8835		1,8831	— 0,227	
36,4	Ca	0,0205		0,1907		1,0529	+ 0,541	
60	NH_3	0,0479		0,4454	% Cl			
10. Febr.	N	1,9015	1000	19,015		do.	— 7,682	2000
36,2	Cl	0,4154		4,154			— 1,173	
36,4	P	0,2052		2,052			— 0,278	
78	Ca	0,0251		0,251			+ 0,481	
	NH_3	0,0455		0,455				

(j) I. Periode. 6 Tage.

		g N	g Cl	g P	g Ca
2500 H_2O Nahrung:		5,28	6,12	1,17	1,44
(k) Verhältniss:		3,6 :	1,5 :	0,8 :	1
(l) 1100 H_2O Ausscheid.	Harn	27,10	0,16	1,29	0,01
	Koth	0,64	—	0,56	1,32
		27,74	0,16	1,85	1,33
Verhältniss:		21,4 :	0,1 :	1,4 :	1
+ 1400 H_2O Retention: (m)		— 22,36	+ 1,96	— 0,68	+ 0,11
in pCt. der Aufnahme: (n)		— 400	+ 35	— 57	+ 9

II. Periode. 4 Tage.

		g N	g Cl	g P	g Ca
2000 H_2O Nahrung:		11,27	2,85	1,65	1,35
Verhältniss:		8,5 :	2,2 :	1,4 :	1
1000 H_2O Ausscheid.	Harn	21,04	3,24	2,09	0,17
	Koth	0,32	—	0,28	0,60
		21,36	8,24	2,37	0,77
Verhältniss:		28 :	4 :	3 :	1
+ 1000 H_2O Retention:		— 20,09	— 0,39	— 0,72	+ 0,58
in pCt. der Aufnahme:		— 90	— 13	— 30	+ 40

[Legend:] a) date, temperature, pulse; b) % content; c) amount of urine; d) excretion; e) urine; f) feces; g) nourishment; h) result; i) water; j) period - day; k) ratio; l) secretion; m) retention; n) % of intake.

In this case patient was given 0.9 g silver nitrite in order to study the influence of chlorine salt. As Limbeck points out in his pathology of blood, the salt of the heavy metals is supposed to densify the blood. In studying a number of blood analyses, we found that silver nitrite increases chlorine in the blood. (Concerning the chlorine and phosphorous content in the blood in diseased cases, Virchov's Archives, Vol 146, 1896, page 424.) The chlorine content in the blood is higher after the crisis than before the crises. Consequently, it may be assumed that silver nitrite delays the crises and promotes the decomposition of nitrogen.

We did not witness a delay of the crisis, however, the loss of nitrogen was particularly great in this case. Since our numerous observations permit us to refer to this

as a typical fever secretion, we should stress the fact that silver nitrite had effected a higher retention of chlorine and a greater elimination of phosphorous and calcium. Even after the crisis, a significant amount of nitrogen is eliminated. It is nine times greater than phosphorous, while in the other cases it exceeds phosphorous seven or six times. No influence was evident in the excretion of the bowels.

We may at least conclude that silve nitrite exercises no favorable influence because it neither strengthens the endurance of calcium phosphate nor retards the decomposition of albumen as the chlorides do.

We also observed the ammonium secretion and found the expected results: a slight rise during fever, reaching the maximum on the day of the crisis.

CASE VI

P. K., 39 years old. Pleuropneumonia dextra.

Anamnesis.

Patient comes from a healthy family. Suffered from typhoid at the age of 25. Had gonorrhea once. He is a moderate drinker and smoker. The illness broke out seven days ago with the typical symptoms. On the second day leeches were attached.

Status praesens.

Except for the changes in the lungs, no abnormalities in the organs. No enlargement in the spleen and liver.

The patient was under observation for two days. He was given 110 g sugar daily in addition to the usual diet which consisted of milk, bouillon with egg, and wine.

Feces was not collected. Urine was tested for N, Cl, P, and Ca.

The blood test showed 85% hemoglobin, 4,200,000 red and 40,000 white corpuscles, among these 93% multi-granular, 1.5% transitional forms, 0.6 large, 0.6 small lymphocites, no cosinophile.

The temperature and pulse are shown in the table.

a) Datum. Temp. Puls.	b) Procent-Gehalt.	c) Harn-menge. ccm	d) Harn-Ausgabe.	e) Nahrung.	f) Resultat.
24. März	N 1,4525	820	11,9105	5,6138	− 5,2967
35,2	Cl 0,0035		0,0291	3,0680	+ 3,0398
99,1	P 0,0181		0,1485	1,5513	+ 1,1377
100	Ca 0,0116		0,0951	1,1766	+ 1,0950
	Mg 0,0102		0,0836		
25. März	N 1,0450	1150	18,9175	do.	− 18,2767
37,6	Cl 0,0071		0,0816		+ 2,9878
37,8	P 0,0038		0,7037		+ 0,7678
37,2	Ca 0,0008		0,0093		+ 1,1678
100	Mg 0,0022		0,0253		

	g N	g Cl	g P	g Ca
1000 H_2O Nahrung	5,64	3,07	1,53	1,18
g) Verhältniss	4,7	: 2,5	: 1,2	: 1
1000 H_2O Ausscheidung im Harn	15,41	0,05	0,58	0,01
+ 900 H_2O Retention: i)	− 9,77	+ 3,02	+ 0,95	+ 1,17
in pCt. der Aufnahme: j)	− 180	+ 100	—	—

[Legend:] a) date, temperature, pulse; b) % content; c) amount of urine; d) urine secretion; e) nourishment; f) result; g) ratio; h) secretion; i) urine; j) retention; k) % of intake.

This case, which complements case IV, also indicates that sugar influences the retention of albumen. In both cases the nitrogen secretion is low, and the loss not as significant as it is without sugar added to the same diet. The following case was treated with common salt, the preceding with silver nitrite. The greatest loss of N occurred in the case treated with silver nitrite, the lowest -- in the case treated with sugar. In a case where no treatment was given, the loss of nitrogen was greater than in the case where sugar was used. The sugar had no influence on other urine components, such as calcium.

CASE VII

H. J., 46 years old. Pleuropneumonia sinistra (lethal).

Anamnesis.

The patient, who comes from a healthy family, was ill once. This illness broke out four days ago.

Status Praesens.

No change in the organs except for the lung. Temperature 38 to 39°. Pulse 100 to 150. Patient collapses.

Venaesection and oxygen inhalation unsuccessful. Patient was under observation for two days. The diet consisted of milk and bouillon:

800 ccm milk,
800 ccm bouillon,
800 ccm wine,
1000 ccm water.

3400 ccm liquid.

In addition patient received a daily dosage of 5 g sodium chloride and 5 g calcium phosphate (see next table).

The two-day observation, which was disrupted by the patient's death, offers no significant data. The salts had little influence on the excretion. Almost the entire amount of phosphorous was retained, and the same applies to the chlorine.

a) Procentgehalt.	b) Harnmenge. ccm	a) Harn-Ausscheidung.	d) Nahrung.	e) Bilanz.
N 2,275	1000	22,770	5,768	— 16,982
Cl 0,0607		0,607	2,584	+ 1,977
P 0,0966		0,966	0,504	— 0,462
Ca 0,0048		0,048	0,610	+ 0,562
N 2,4585	1050	25,768	5,768	— 20,000
Cl 0,0061		0,063	2,584	+ 2,521
P 0,0909		0,955	0,504	— 0,451
Ca 0,0025		0,026	0,610	+ 0,584

		g N	g Cl	g P	g Ca
3400 H_2O	Nahrung:	5,77	2,58 (+ 8,035)	0,50 (+ 1,00)	0,61 (+ 2,00)
	f) Verhältniss:	9,4 :	4,5 :	0,8 :	1
1000 H_2O	g) Ausscheidung:	24,26	0,58	0,96	0,035
	Verhältniss:	—	—	—	—
+ 2400 H_2O	h) Resultat:	— 18,49	+ 2,25 (+5,28)	— 0,46 (+,54)	+ 0,58
in pCt.	d) Aufnahme:	— 800	+ 90 (+ 90)	— 90 (+ 30)	+ 90

[Legend:] a) content in percent; b) amount of urine; c) urine secretion; d) nourishment; e) balance; f) ratio; g) secretion; h) result; i) intake.

CASE VIII

B. R., 21 years old. Pleuropneumonia sin. dextra.

Anamnesis.

Patient comes from a healthy family. Has never been sick. He had a shivering fit one day ago, and when he

was brought to the hospital.

Status praesens.

No visible signs of abnormality in the organs with the exception of lung infiltration. Spleen not enlarged. Temperature fluctuates between 40 and 39°. Pulse 124.

There was the danger of total collapse just before the crisis. During the fever he was often unconscious, making it difficult to collect the secretion. He also suffered a great deal from diarrhea.

As usual, the diet consisted of milk and bouillon. After the crisis he was put on beefsteak, cutlets, gruel, and bread. 400 ccm mil, 400 ccm bouillon, 500 ccm wine -- a total of 1800 ccm liquid.

a) Datum.	b) Temp.	c) Puls.	d) Procentgehalt.	e) Harnmenge. ccm	f) Ausgaben g) Harn.	f) Ausgaben h) Koth.	i) Nahrung.	j) Resultat.
3. Febr.	39,6	116	N 1,9215	1000	19,215		5,768	− 12,795
			Cl —		Spur		2,584	+ 2,433
			P 0,1335		1,3353		0,504	− 0,931
			Ca 0,0032		0,0321		0,610	− 0,507
4.. 5. Feb.	40,2	120	N 2,1507	800	17,206		5,768	− 11,786
	38,6	116	Cl 0,00607		0,0485		2,584	+ 2,405
	39,8	124	P 0,08091		0,6472		0,504	− 0,243
	39,6	124	Ca 0,0026		0,0212		0,610	+ 0,607
	39,9	128				Cl 0,1306 g N 0,384 g Ca 0,7147 g P 0,999 g		
6. Febr.	38,2	112	N 2,030	750	15,225		14,240	− 1,330
	39,3	112	Cl 0,06068		0,4551		5,977	+ 5,391
	39,2	108	P 0,0335		0,2514		1,435	+ 1,084
			Ca 0,00107		0,00801		1,743	+ 1,671
7. Febr.	38,0	116	N 1,7500	1000	17,500		14,240	− 3,608
	38,5	112	Cl 0.1334		1,334		5,977	+ 4.512
	39,4	120	P 0,0886		0,8864		1,437	+ 0,451
			Ca 0,0009		0,0093		1,743	+ 1,661
8. Febr.	38,6	116	N 1,589	1200	19,068		14,240	− 5,176
	38,8	112	Cl 0,1568		1,8810		5,977	+ 3,965
	38,9	112	P 0,1136		1,3636		1,435	− 0,028
	38,2	108	Ca 0,0002		0,0025		1,743	+ 1,668
	39,6	124						
9. Febr.	38,1	120	N 1,470	1100	16,170		6,792	− 9,776
	39,0	124	Cl 0,18204		1,9624		1,6014	− 0,492
	38,3	128	P 0,08523		0,9375		1,1316	+ 0,096
	38,8	124	Ca 0,0009		0,0099		1,602	+ 1,529
	39,4	136						

[continued on following page]

10. Febr.	38,6	116	N	1,386	1350	18,711	Ca 0,7147 g p. d.	14,724	− 4,535
	39,0	124	Cl	0,1820		2,4570		6,809	+ 4,209
	38,7	120	P	0,09818		0,0204		1,612	+ 0,592
	38,5	130	Ca	0,0011		0,0148		1,737	+ 1,077
11. Febr.	38,4	120	N	1,442	1300	18,746		15,809	− 3,845
	37,8	114	Cl	0,2124		2,7607		5,367	+ 2,375
	38,8	120	P	0,0767		0,0972		1,850	+ 0,957
	38,5	128	Ca	0,0036		0,0728		1,201	+ 1,056
12. Febr.	37,5	116	N	1,4595	1200	17,514		17,157	- 0,705
	36,0	88	Cl	0,3943		4,7323	Cl 0,1206 g Ca 0,7147 g	6,870	+ 2,007
	37,0	92	P	0,08167		0,9800		1,582	+ 0,406
			Ca	0,0051		0,0612		1,907	+ 1,771
13. Febr.	36,0	84	N	1,0502	1800	18,9036		21,905	+ 3,748
	35,9	76	Cl	0,4186		7,5348		7,509	− 0,126
	37,9	104	P	0,0810		1,4581		1,464	− 0,994
			Ca	0,0057		0,1026		1,721	+ 1,589
14. Febr.	36,8	104	N	0,595	1800	10,710	N 0,3149 g P 0,0999 g	21,730	+ 10,072
	37,1	96	Cl	0,3155		5,6799		9,077	+ 3,677
	37,3	92	P	0,07504		1,3147		1,559	+ 0,145
			Ca	0,0050		0,0900		1,741	+ 1,576

k)

1. Periode. 2 Tage.

		g N	g Cl	g P	g Ca
2000 H_2O	Nahrung:	5,77	2,58	0,50	0,01
	l) Verhältniss:	8,6 :	4,3 :	0,8 :	1
m) Ausscheid. 900 H_2O	(Harn n)	18,21	0,02	0,99	0,020
	(Koth o)	0,35	0,13	0,99	0,071
		18,56	0,15	0,09	0,097
	Verhältniss:	185 :	1,5 :	10 :	1
+ 1100 H_2O	Resultat:	− 12,79	+ 2,43	− 0,59	+ 0,52
		− 220 pCt.	+ 98 pCt.	− 118 pCt.	+ 88 pCt.

k)

II. Periode. 6 Tage.

		g N	g Cl	g P	g Ca
2500 H_2O	Nahrung:	13,84	5,19	1,50	1,03
	l) Verhältniss:	8,3	5,2	0,9	1
m) Ausscheid. 1200 H_2O	(Harn n)	17,57	1,81	0,91	0,019
	(Koth o)	0,35	0,13	0,09	0,071
		17,92	1,94	1,00	0,09
	Verhältniss:	179 :	19 :	10 :	1
n) + 1200 H_2O	Resultat:	− 4,08	+ 3,25	− 0,50	+ 0,94
		− 55 pCt.	+ 65 pCt.	− 33 pCt.	+ 94 pCt.

III. Periode. 3 Tage.

		g N	g Cl	g P	g Ca
2000 H_2O	Nahrung:	20,29	7,69	1,50	1,79
	Verhältniss:	11,5 :	4,3 :	0,8 :	1
Ausscheid. 1600 H_2O	(Harn	15,71	5,68	1,05	0,585
	(Koth	0,35	0,13	0,09	0,071
		16,03	6,11	1,54	0,156
	Verhältniss:	100 :	40 :	9 :	1
+ 400 H_2O	Resultat:	+ 4,23	+ 1,58	+ 0,16	+ 1,24
		+ 20 pCt.	+ 20 pCt.	+ 10 pCt.	+ 70 pCt.

[Legend:] a) date; b) temperature; c) pulse; d) content in percent; e) amount of urine; f) excretion; g) urine; h) feces; i) nourishment; j) result; k) period - day; l) ratio; m) secretion; n) urine; o) feces.

The period of observation was divided into three parts in order to do justice to the different types of food intake.

The first period lasted two days. The patient lost N and P, and retained Cl and Ca. The feces was very sparse and for this reason was examined only once. A typical secretion during fever was observed. The very slow return to normal conditions is very clear in this case. At first an increased secretion of chloride takes place. Only then the phosphate begins to restrain its increased secretion (which becomes even more pronounced after the crisis). Calcium remains parallel to the chloride. In this case -- as in other cases -- the secretion of calcium shows the pre-critical decrease in lime. This is almost a sure sign of an impending crisis: 0.0032, 0.0026, 0.0011, 0.0009, 0.002, 0.0009, 0.0011, 0.0056, 0.0051. crisis

The decrease in calcium is not as clear in all cases; however, wherever it does exist, the crisis may be predicted with a great deal of certainty.

The water retention is typical in this case as well: during fever it amounts to 1000 ccm daily, after the fever only 400 ccm. Approximately 500 ccm should, of course, be allowed for the perspiration insensibilis and saliva. If the balance does not exceed +500, a loss of water may be observed with the absence of fever.

CASE IX.

K. Bl. 35 years old. Pneumonia fibrinosa.

Anamnesis.

The patient's parents are alive and in good health. Of nine brothers and sisters, seven are alive. The patient suffered from malaria and inflammation of the eyes in his childhood. Five years ago he had pains in the right knee joint. The present illness began with a shivering fit, followed by piercing in the chest and so forth. The illness lasted for one week.

Status Praesens.

No significant signs except for damping in the region of the left lower and right upper lung. Bronchial breathing audible over the damping. Vocal fremitus increased. No other visible abnormalities in the organs. The blood contains 75% hemoglobin, 5,150000 red and 17031 white corpuscles. Amount of urine 600 -- 1300 ccm. Specific weight 1019 to 1022.

The patient was put on a liquid diet consisting of 1250 ccm milk, 250 ccm wine, and 3 syphon. It contained 1.048 g nitrogen, 1.646 g chlorine, 1.276 g phosphorous, 1.54 g calcium.

After the crisis the diet was changed and contained 13.755 g nitrogen, 3.681 g chlorine, 2.141 g phosphorous, 1.553 g calcium.

In addition the patient was given a daily dosage of 11 g sodium chloride which corresponds to 6.6748 g chlorine.

Temperature and pulse are shown in the table.

a) Datum. Temp. Puls.	b) Procent-Gehalt.		c) Harn-menge. ccm	d) Ausgaben e) Harn.	f) Koth.	g) Nahrung.	h) Resultat.
6. Mai 39,2 104	N Cl P Ca	1,636 0,071 0,19848 —	1850	22,056 0,0585 2,673	1,345 0,074 0,522 0,3692	0,048 1,646 1,276 1,549	— 17,353 + 0,614 (+ 6,7) — 1,919 + 0,330
7. Mai 38,7 100	N Cl P Ca	1,850 0,0345 0,1296 0,0069	1450	27,405 1,308 2,871 0,01305	—	do. und 11 g NaCl	— 24,702 + 0,209 (+ 6,7) — 2,117 + 0,593
8. Mai 37,1	N Cl P Ca	2,170 0,2154 0,1954 0,0048	1200	26,040 2,5008 2,351 0,0576	—	do.	— 21,240 — 0,989 (+ 5,8) — 1,627 + 0,627
9. Mai 36,5	N Cl P Ca	2,240 0,3456 0,1852 Spur	1000	22,400 3,456 1,852 Spur	—	do.	— 17,649 — 1,884 (+ 4,9) — 2,702 + 0,580
10. Mai 36,4	N Cl P Ca	1,705 0,5218 0,2911 0,0052	1200	20,460 6,261 3,4932 0,0624	—	13,755 3,681 2,141 1,553	— 8,056 — 2,634 (+ 4,0) — 1,874 + 0,018
11. Mai 36,0	N Cl P Ca	1,495 0,7455 0,3135 0,0059	1400	20,972 10,4370 4,389 0,0788	—	do.	— 8,362 — 0,820 (— 0,2) — 2,770 + 0,068
12. Mai 35,6	N Cl P Ca	1,020 0,0070 0,2315 0,0069	1860	18,972 11,700 4,4733 0,1282	—	do.	— 6,562 — 7,683 (— 1,0) — 2,834 + 0,705
13. Mai 35,5	N Cl P Ca	0,702 0,477 0,1456 0,0072	2500	17,55 11,9250 3,640 0,1800	—	do.	— 5,140 — 6,318 (— 1,7) — 2,021 — 0,768

[continued on following page]

I. Periode. 4 Tage.	g N	g Cl	g P	g Ca
2700 H_2O Nahrung:	6,04	1,64	1,27	1,55 (8,21 Cl)
Verhältniss:	4 :	1,1 :	0,8 :	1 5,5
1200 H_2O Harn	24,45	2,03	2,85	0,022
Ausscheid. Koth	1,35	0,07	0,52	0,969
	25,83	2,15	3,37	0,992
Verhältniss:	26 :	2 :	3,8 :	1
+ 1500 H_2O Retention:	— 19,79	— 0,51	— 2,10	+ 0,66 (+ 6,07 Cl)
in pCt. der Aufnahme:	— 300	— 30	— 180	+ 44 (+ 70)

II. Periode. 4 Tage.	g N	g Cl	g P	g Ca
H_2O Nahrung:	13,75	3,08	2,14	1,55 (10,32 Cl)
Verhältniss:	9 :	2,4 :	2,5 :	1 7
1700 H_2O Harn	19,49	9,98	3,59	0,108
Ausscheid. Koth	1,35	0,07	0,52	0,969
	20,84	10,05	4,51	1,276
Verhältniss:	29 :	9 :	4 :	1
+ H_2O Retention:	— 7,09	— 3,27	— 2,37	+ 0,38 (+ 0,27 Cl)
in pCt. der Aufnahme:	— 50	— 100	— 110	+ 23 (+ 26)

[Legend:] a) date, temperature, pulse; b) content in percent; c) urine amount; d) excretion; e) urine; f) feces; g) nourishment; h) result; i) period - days; j) ratio; k) secretion; l) urine; m) feces; n) retention; o) % of intake.

In this case 11 g common salt were given to the patient. This high dosage had an influence on the decomposition of albumen. Both the absolute and relative loss of nitrogen during fever were high. A great deal of phosphorous was secreted both during and after the fever. Only calcium did not increase and remained retained following the crisis.

The general impression is that the common salt effected the expiration of the illness. The retained chlorine is released suddenly, so that in spite of the 11 g common salt, a loss of chlorine occurs in the post-crisis period. The crisis occurred on the second day of treatment, and six days later the secretion was normal. Increased phosphorous secretion lasts three days; the amount secreted decreases as rapidly as it had increased. The increased secretion of chlorine and calcium is unbelievably rapid after the crisis, while the secretion of nitrogen decreases from day to day. One might say that a nitrogen retaining effect sets in during the post-crisis period, and makes up for the losses during fever.

CASE X

K. Sch., 25 years old, laborer. 2 December 1898.

Anamnesis.

Patient gives very little information about his parents. Has no brothers or sisters. Three years ago he had a rash which was cured with mercury. The present illness broke out five days ago with shivering, piercing chest pain, and fever. The sputum contained no blood.

Status praesens.

Auscultation and percussion showed an infiltration of the left lung. Other organs were normal. The blood test showed 4,200000 red and 16000 white corpuscles, 89% hemoglobin on 2 December. After the crisis there were 4,800000 red and 10000 white corpuscles; the hemoglobin was 90%.

History.

The patient received 10 g calcar. phosphorous daily. Had no complaints during this treatment until 15 December. Recovered shortly afterwards. Weight 55.5 to 52 kg.

2 Dec.	Temp. 38.6	Pulse ---	Respiration ---	
3 Dec.	Temp. 39.5	Pulse 112	" 48	1 bowel movement, Wt 55.5kg
4 Dec.	Temp. 38.2	Pulse 104	46	
5 Dec.	Temp. 37.5	Pulse 64?	30	
6 Dec.	Temp. 36.1	Pulse 72	28	1 bow. mov.
7 Dec.	Temp. 36	Pulse 48	28	
8 Dec.	Temp. 36	Pulse 48	24	
9 Dec.	Temp. 36.2	Pulse 52	24	1 bow. mov.
10 Dec.	Temp. 36.3	Pulse 44	20	

The diet consisted of the following: 1250 ccm milk, 250 g wine, 1600 g syphon, a total of 3100 ccm liquid.

In viewing this table, we cannot help recalling that which has previously been said about sodium chloride treatment. The addition of calcium phosphate accelerated the process in this case as well. The crisis occurred on the seventh day of the illness. After five days the secretion was normal. The calcium phosphate was re-absorbed and did not appear in the feces. Almost all calcium was retained. A portion of the phosphate was secreted. The retention of chlorine was relatively low, yet the secretion of chlorine was far lower than that effected by common salt. A significant quantity of water was eliminated, so that the body lost approximately 700 ccm daily after the crisis.

a) Datum. Temp. Puls.	b) Prozent-Gehalt.	c) Harnmenge ccm	d) Abgaben e) Harn.	f) Koth.	g) Nahrung	h) Resultat	i) Wasser
2. Dec. 38.6	N 2,226 Cl 0,11715 P 0,0450 Ca 0,00093	1000	22,260 1,1715 0,4500 0,0093		0,7500 2,1014 1,3500 1,5784	— 16,570 + 0,919 — 1,078 (+ 0,9) — 0,740 (+ 3,2)	3000
3. Dec. 38.5 110	N 2,0655 Cl 0,09585 P 0,05950 Ca 0,00156	850	19,05225 0,81956 0,57095 0,0129	P 0,958 Ca 2,314	do.	— 13,562 + 1,180 — 1,601 (+ 1,06) — 0,748 (+ 3,3)	3000
4. Dec. 38.5 104	N 2,065 Cl 0,0590 P 0,1222 Ca 0,0065	1130	23,3345 0,4407 1,4811 0,00565	N 0,610 Cl 0,0140	do.	— 17,014 + 1,650 — 2,109 (— 0,04) — 0,741 (+ 3,2)	1500
5. Dec. 37,5 64	N 2,415 Cl 0,01775 P 0,58000 Ca 0,00123	1500	36,225 0,22625 2,0700 0,01845		do.	— 30,535 + 1,564 — 2,668 (— 0,65) — 0,754 (+ 3,2)	1500
6. Dec. 46.1 72	N 1,400 Cl 0,0781 P 0,1204 Ca 0,00142	1300	18,2000 1,0154 1,5622 0,01846		6,5247 3,1219 1,599 1,1207	— 12,218 + 2,033 — 0,730 (+ 1,29) — 0,422 (+ 3,5)	—
7. Dec. 36.0 48	N 0,945 Cl 0,1562 P 0,1026 Ca 0,00447	2500	23,625 4,050 2,565 0,11175	P 0,647 Ca 0,524	7,3827 3,5562 1,8741 1,3279	— 16,635 — 1,687 — 1,598 (+ 0,63) — 0,208 (+ 3,6)	—
8. Dec. 36.0 48	N 0,775 Cl 0,1775 P 0,0947 Ca 0,00532	2200	16,940 3,905 2,0834 0,13004	N 0,342 Cl 0,0133	do.	— 9,910 — 0,562 — 0,916 (+ 1,057) — 0,565 (+ 3,6)	—
9. Dec. 36.2 52	N 0,805 Cl 0,1420 P 0,06725 Ca 0,00657	1500	12,075 2,130 1,0087 0,09855		do.	— 5,085 + 1,213 + 0,059 (+ 2,06) — 0,195 (+ 3,7)	—

i) 1. Periode. 4 Tage.

	g N	g Cl	g P	g Ca
5100 H_2O Nahrung:	6,30	2,10	1,53 (+ 2,06)	1,57
k) Verhältniss:	4,2 (0,2) :	1,5 (0,4) :	0,9 (0,6) :	1 (1) (+ 4,0)
1100 H_2O l) Harn m)	25,21	0,69	1,69	0,011
Ausscheid. Koth m)	0,61	0,01	1,56	2,314
	25,82	0,70	3,05	2,325
Verhältniss:	9 :	0,3 :	1,2 :	1
o) + 2000 H_2O Retent.:	— 19,52	+ 1,40	— 1,72 (+ 0,84)	— 1,06 (+ 3,06)
p) in pCt. d. Aufnahme:	— 300	+ 70	— 130 (+ 10)	— 60 (+ 60)

II. Periode. 4 Tage.

	g N	g Cl	g P	g Ca
1700 H_2O Nahrung:	7,07	3,15	1,65 (3,71)	1,17 (5,17)
Verhältniss:	5,9 (1,4) :	2,6 (0,6) :	1,4 (0,7) :	1 (1)
1900 H_2O Harn	17,71	2,84	1,83 (1,83)	1,83 (0,92)
Ausscheid. Koth	0,34	0,01	0,65 (0,65)	1,52 (1,52)
	18,05	2,85	2,48 (2,48)	2,45 (2,44)
Verhältniss:	7,5 :	1,2 :	1 :	1
— 200 H_2O Retent.:	— 10,98	+ 0,33	— 0,85 (+ 1,23)	— 1,27 (+ 2,73)
in pCt. d. Aufnahme:	— 150	+ 12	— 50 (+ 43)	— 110 (+ 50)

[Legend:] a) date, temperature, pulse; b) content in percent; c) amount of urine; d) excretion; e) urine; f) feces; g) nourishment; h) result; i) water; j) period - days; k) ratio; l) secretion; m) urine;

n) feces; o) retention; p) % of intake.

An albumen retaining effect was not noted. The water retention during fever is also considerable. Consequently, imbibition was not retarded in either case. The rapid decrease of the nitrogen secretion, however, indicates the tendency of common salt to shorten the process considerably. Other conclusions may be drawn from the table.

CASE XI

H. P., 46 years old, driver. 8 January 1899.

Anamnesis.

The patient, who comes from a healthy family, has always been in good health. The present illness broke out four days ago with fever and piercing chest pain. Patient complained of headaches and weakness. He claims to have done a great deal of drinking. Denies having had venereal infections.

Status praesens.

No pathological findings except for changes in the lungs. Patient either unconscious, or complains of headaches. After a general weakness on the ninth day, the illness terminates in death.

The patient was put on a specific diet and given 1.0 g nucleic acid.

The quantity of sputum was not significant. The urine contained albumen. Small amount of feces went under the patient.

The temperature was as follows:

3 January	temperature 39.5; 38		
4 January	temperature 39.0 - 39.5	Pulse 88	Respiration 52
5 January	temperature 39.3 - 39.5	Pulse 100	Respiration 40
6 January	temperature 38.7 - 39.5	Pulse 100	Respiration 44
7 January	temperature 38.7 - 39.3	Pulse 80	Respiration 44
8 January	temperature 38.2 - 40.2	Pulse 88	Respiration 32.

The diet consisted of the following:

1250 ccm milk,
250 ccm wine,
1600 ccm syphon
3100 ccm liquid.

a) Datum. Temp. Puls.	b) Procentgehalt.	c) Harnmenge. ccm	d) Harn-Ausscheidung	e) Nahrung.	f) Resultat. Nucleinsäure.
3. Jan.	N 2,2505	530	11,9226	6,5000 g N	− 5,627
	Cl 0,0035		0,0185	2,103 „ Cl	+ 2,085
39,5	P 0,0293		0,1553	1,350 „ P	+ 1,185
	Ca 0,0024		0,0127	1,5 „ Ca	+ 1,566
	P_1 0,0183		0,0970		
	P_{II} 0,0110		0,0583		
	NH_3 0,0375		0,1987		
4. Jan.	N 1,6625	430	7,1457	do.	− 0,848
	Cl 0,0036		0,0155		+ 2,088
39,0	P 0,0161		0,0692		+ 1,201
88	Ca 0,0035		0,0151		+ 1,563
	P_1 0,0026		0,0117		
	P_{II} 0,0135		0,0575		
	NH_3 0,05495		0,2363		
5. Jan.	N 2,2505	700	15,7035	do.	− 9,453
	Cl 0,0036		0,0252		+ 2,068
38,3	P 0,07771		0,5404		+ 0,790
100	Ca 0		0,72 ber.		+ 1,536
	P_1 0,04984		0,3488		
	P_{II} 0,02757		0,1915		
	NH_3 0,0592		0,4144		
6. Jan.	N 2,2505	1400	31,5110	do.	− 25,011
	Cl 0,0041		0,0574		+ 2,046
38,7	P 0,0349		0,4886		+ 0,842
100	Ca 0,0025		0,0352		+ 1,539
	P_1 0,0224		0,0316		
	P_{II} 0,0245		0,3570		
	NH_3 0,0571		0,7994		
7. Jan.	N 1,565	1170	17,66-5	do.	− 11,...98
	Cl 0,0051		0,0563		+ 2,047
38,7	P 0,0555		0,6494		+ 0,681
88	Ca 0,0035		0,0403		+ 1,538
	P_1 0,0506		0,5580		
	P_{II} 0,0249		0,2914		
	NH_3 0,0175		0,2046		
8. Jan.	N 1,045	870 ?	10,45	6,5000 g N	− 10,150
	Cl 0,0036		0,036	2,103 „ Cl	+ 2,066
38,2	P 0,0791		0,791	1,350 „ P	+ 0,539
88	Ca 0,0010		0,010	1,576 „ Ca	+ 1,568
	P_1 0,0524		0,524		
	P_{II} 0,0267		0,267		
	NH_3 0,0396		0,396		

		g N	g Cl	g P	g Ca
3000 ccm H_2O	Nahrung:	6,50	2,..	1,53	1,57
	a) Verhältniss:	4,2 :	1,5 :	0,8 :	1
800 ccm H_2O	b) Ausscheidung:	16,70	0,03	0,45	0,024
+ 2300 ccm H_2O	c) Retention:	− 10,40	+ 2,7	+ 0,88	+ 1,54
	in pCt. der d) Aufnahme:	− 170	90	60	90

[Legend on the following page]

[Legend:] a) date, temperature, pulse; b) content in percent; c) amount of urine; d) urine secretion; e) nourishment; f) result of nucleic acid; g) ratio; h) secretion; i) retention; j) % of intake.

This case terminated in death. In addition to the usual diet, we have him 1 g nucleic acid daily in order to observe its influence. We started with the assumption that nucleic acid is a decomposition product of the organism, and we were interested in observing the effect of adding such decomposition products. Unfortunately the patient perished, and the course of the illness does not permit us to darw conclusions except for the one that nucleic acid does not have a healing effect. There is no reason to reproach ourselves for having worsened the patient's condition through the addition of nucleic acid. The case was serious to start with, showing a secretion which was not at all typical. The secretion of nitrogen was marked by fluctuations, and the secretion of phosphorous was relatively low.

In determining the acidic and basic phosphates, we found no uniform pattern. One day the acidic phosphates predominate, the next day the basic ones. A predominance of acidic phosphates was not always accompanied by an increase of ammonium. In brief, the pattern was totally irregular.

As v. Weissmayr (Zeitschr. fur klin. Med., Vol 32, page 313, article in honor of von Schrotter) has shown, it is possible that this was not a case of typical pneumonia. It is bacteria of this kind which thoroughly influence the course of pneumonia. Unfortunately we know nothing about the differences in the metabolism in streptococci pneumonia and diplococci pneumonia.

Nevertheless, this case is of particular importance to us because it shows the influence of nucleic acid as well as the periodic fluctuations in the secretion.

CASE XII

J. K., 23 years old. Laborer. 28 February 1898. Pneumonia fibrinosa dextra.

Anamnesis.

Parents of the patient deceased. Father is supposed to have been a drinker. Patient suffered from pneumonia five years ago. At that time he spent three weeks in the hospital. He suffered from a severe cold one week ago, and complains of having had piercing pain in the chest, coughing weakness, loss of appetite since then. Has supposedly no potus or infections.

Status praesens.

No abnormal findings except for changes in the right lung. 90% of the leucocites are multi-granular, 2% the size of one granule, 6% small, 1% eosinophile. The urine shows a trace of albumen, no sugar. A microscopic examination of the sediment shows many white and red corpuscles.

In addition to the usual fever diet, the patient received a daily dosage of 10 g salt, equivalend to 0.068 g chlorine.

The observation lasted four days, with two days devoted to the fever period and two days to the post-critical period. The patient was given 10g common salt daily. Feces were collected throughout this period, but examined only once.

There was a relatively slight loss of nitrogen during fever, it increased considerably immediately after the crisis, and diminished on the following day. This case also shows that common salt accelerates secretion. A retention of albumen is not quite clear. The diuretic effect of common salt on phosphorous is pronounced. The common salt, however, has no effect on the secretion of calcium. The retention of chlorides remains undisturbed. All common salt which was added was retained, so that the balance is positive even if we exclude the additional salt. The feverish organism can thus take 10 g common salt without the secretion being at all influenced. The opinion of Schwarz (Wiener med. Blatter (Viennicse Medical Journal), 1895, No 49, 50, 51) that the retention of common salt during fever may be explained through chloride substituting for phosphate cannot be true, because the daily loss of phosphorous reaches a maximum of 2 g, while the retention of chlorine may contain as much as 10 g.

a) Datum.	b) Temp.	c) Puls.	d) Procentgehalt.	Harnmenge ccm	f) Ausgaben. g) Harn	Koth	Nahrung	j) Resultat.
25. III	38,7	104	N 1,610	1010	16,261	0,6545 g P	7,560	9,070
	38,4		Cl 0,0213		0,215		1,984	+ 1,025 (+ 6)
	38,5		P 0,1997		2,016		1,506	− 1,674
			Ca 0,0023		0,024		1,758	+ 0,587
29. III.	38,2							
	38,1	104	N 1,764	780	12,8772		7,560	− 6,756
	37,9		Cl 0,0419		0,3058	0,7497 g Cl	1,984	+ [illegible] (+ 6)
	37,3	80	P 0,2024		1,4776		1,506	− 0,[illegible]
	37,2		Ca 0,0028		0,021		1,758	+ 0,550
	36,9							
	35,9					1,9195 g N		
30. III.	36,2	72	N 1,8515	1500	27,772	1,1455 g Ca pro die	7,560	− 20,461
	36,0		Cl 0,0710		1,065		1,984	+ 0,173 (+ 6)
	36,1		P 0,2461		3,691		1,506	− 2,643
	36,5		Ca 0,0060		0,090		1,758	− 0,520
31. III	36,0	80	N 1,610	1000	16,100		11,985	5,874
	36,1		Cl 0,5088		8,088		2,641	− 0,193 (+ 6)
			P 0,5456		5,456		2,316	− 4,094
			Ca 0,0050		0,050		1,398	− 0,560

k)		g N	g Cl	g P	g Ca
I. Periode 2 Tage. Vor der Krise.					
2500 ccm H_2O Nahrung:		7,56	1,98	1,59	1,76
l) Verhältniss:		4,4 :	1,1 (5) :	0,9 :	1
m) Ausscheidung { Harn: n)		14,57	0,26	1,74	0,022
870 ccm H_2O { Koth: o)		1,25	0,75	0,65	0,147
		15,82	1,01	2,39	1,17
Verhältniss:		15 :	0,9 :	2 :	1
+ 1600 ccm H_2O Resultat:		− 8,26	+ 0,97 (+ 7,04)	− 0,80	+ 0,59
p) in pCt. der Aufnahme:		− 110	+ 45 (+ 90)	− 50	+ 34
II. Periode 2 Tage. Nach der Krise.		g N	g Cl	g P	g Ca
2500 ccm H_2O Nahrung:		9,77	2,86 (8,93)	1,95	1,57
Verhältniss:		6,5 :	1,9 (6) :	1,2	1
Ausscheidung { Harn:		21,94	2,07	4,57	0,07
1250 ccm H_2O { Koth:		1,25	0,75	0,65	1,170
		23,19	2,82	5,22	1,24
Verhältniss:		19 :	2,3 :	4 :	1
+ 1250 ccm H_2O Resultat:		− 12,42	+ 0,04 (6,11)	− 2,62	+ 0,33
in pCt. der Aufnahme:		− 125	+ 1 (+ 70)	− 130	+ 22

[Legend:] a) date; b) temperature; c) pulse; d) content in percent; e) amount of urine; f) excretion; g) urine; h) feces; i) nourishment; j) result; k) period - days after crisis; l) ratio; m) secretion; n) urine; o) feces; p) % of intake.

CASE XIII

R. P., 37 years old. Pleuropneumonia sinistra.

Anamnesis.

Patient comes from a healthy family. Has always enjoyed good health with the exception of a malaria infection five years ago. The current complaint started five days ago

with headaches, piercing chest pain, and shivering.

He has always led a regular life, and is not married.

Status praesens.

No pathological signs in the organs except for changes in the lungs. The blood was not tested. The customary analysis of urine and feces was made. The patient was not given any medicine. The diet consisted of milk, eggs, wine, and bouillon. The patient was given a great deal of water; however, we did not succeed in collecting more than three liters. The crisis took place on the second day.

The diet consisted of the following:

1100 ccm milk,
250 ccm wine,
250 ccm bouillon
1700 ccm water
4 ccm eggs

3300 ccm fluid (see table)

The observation lasted for four days. The diet remained the same throughout. The feces was examined before and after the crisis. The influence of the water intake was not particularly great. The secretion of nitrogen is great after the crisis, but it was not unusually great during fever.

a) Datum. Temp. Puls.	b) Procentgehalt.	c) Harnmenge ccm	d) Ausgaben e) Harn.	f) Koth.	g) Nahrung.	h) Resultat.	i) Wasser.
7. April	N 1,757	1110	19,403	0,7362 g N	10,2491	− 9,080	3000
38,9	Cl 0,071		0,788	Cl Spur	3,1085	+ 2,080	
39,5	P 0,0497		0,5504	1,2855 g P	2,1259	+ 0,392	
70	Ca 0,0002		0,0022		1,6881	+ 0,8857	
8. April	N 1,778	1250	22,225		10,2491	− 12,712	3800
38,2	Cl 0,0420		0,532	p. d. Cl	3,0673	+ 3,135	
38,5	P 0,0742		0,928	0,8402 g Ca	2,1259	+ 0,014	
38,0	Ca 0,0075		0,094		1,5077	+ 0,759	
68							
10. April	N 2,037	1110	22,601		10,2491	− 13,688	2600
36,5	Cl 0,0917		0,956	1,3466 g N	3,0037	+ 2,645	
36,2	P 0,0589		0,654	0,7297 g P	2,1259	+ 0,742	
36,0	Ca 0,0017		0,0188		1,4657	− 0,992	
37,0							
56							
10. April	N 1,106	1810	20,019		10,2491	− 11,106	2900
36,0	Cl 0,1668		3,019	0,0328 g Cl	3,0037	+ 0,542	
36,4	P 0,0533		0,858	2,4388 g Ca	2,1259	+ 0,539	
36,0	Ca 0,0012		0,0217		1,4657	− 0,994	
60							

[continued on following page]

j) I. Periode. 2 Tage vor der Krise:

		g N		g Cl		g P		g Ca
	Nahrung:	10,24		5,47		2,12		1,46
	3200 ccm:	7	:	2,4	:	1,5	:	1
h) Ausscheidung	l) Harn:	20,56		0,65		0,69		0,05
1180 ccm H_2O	m) Koth:	0,74		—		1,28		0,80
		21,00		0,65		1,97		0,85
		24		0,7		2,2		1
Resultat:		− 11,36		+ 2,76		+ 0,15		+ 0,61
2020 ccm H_2O:		+ 110 pCt.		+ 80 pCt.		+ 7 pCt.		+ 40 pCt.

II. Periode. 2 Tage nach der Krise;

		g N		g Cl		g P		Ca
	Nahrung:	10,24		5,47		2,12		1,46
	2100 ccm:	7	:	2,4	:	1,5	:	1
Ausscheid.	Harn:	21,32		1,96		0,75		0,30
1400 ccm	Koth:	1,35		0,05		0,73		2,44
		21,66		2,01		1,48		2,64
		7		0,7		0,6		1
Resultat:		− 11,42		+ 1,46		+ 0,64		− 1,18
700 ccm:		− 110 pCt.		40 pCt.		+ 30 pCt.		− 80 pCt.

[Legend:] a) date, temperature, pulse; b) % content; c) urine amount; d) excretion; e) urine; f) feces; g) nourishment; h) result; i) water; j) period - days after crisis; k) secretion; l) urine; m) feces.

The loss of phosphorous is very low, the retention of chlorine reaches the usual height. Calcium clearly shows the pre-critical decrease. The feces show the characteristic secretion: during fever there is a clear retention, after fever an increased secretion.

CASE XIV

W. B., 26 years old. 13 March 1898. Pneumonic croup. dextra.

Anamnesis.

Patient's father is supposed to have had tuberculosis of the lungs. Except for childhood diseases, the patient had been in good health. The current disease dates back to 17 January, that is, five days ago. He had severe headaches, shivering, and weakness. At the same time herpes labialis occurred.

Status praesens.

Except for the lungs, all organs appear to be normal.

The blood was not tested. Urine contains no iron or sugar. Patient received 10 g sodium chloride daily in addition to the usual diet.

a) Datum.	b) Temp.	c) Puls.	d) Procent-Gehalt.		Harn. Kot.	e) Ausgaben g) Harn.	h) Kot.		i) Nahrung	j) Resultat.
23. März 10 g NaCl	[illegible]	112	N	2,014	1600	20,430			11,085	— [illegible]
	[illegible]		Cl	0,6671		[illegible]			3,754	+ 5,659 (+ 6)
	[illegible]		P	0,0284		0,4544			0,910	— 1,502
	[illegible]		Ca	0,0042		0,042			1,500	+ 0,403
	38,6						P 0,4744 g C. 1,065			
24. März 11 g NaCl	37,1	100	N	2,0[illegible]	1400	28,[illegible]			do.	— 17,[illegible]
	[illegible]		Cl	0,0[illegible]		[illegible]				+ [illegible] (+ 6)
	37,4		P	0,1[illegible]		2,1[illegible]				— 0,518
	37,1		Ca	0,0034		0,0476				+ 0,469
25. März 11 g NaCl	36,0	70	N	1,834	900	15,[illegible]			do.	— 4,670
	36,6		Cl	0,[illegible]		2,[illegible]	N 0,859 g Cl 0,641 „			+ 1,029 (+ 6)
	36,4		P	0,8[illegible]		8,[illegible]				— 1,726
	36,6		Ca	0,0044		0,0387				+ 0,402

	g N	g Cl	g P	g Ca
2500 H_2O Nahrung:	11,08	5,75 (+ 6,67)	3,64	1,50
k) Verhältniss:	7,9 :	0,5 (7) :	1,5 :	1
1100 H_2O l) Harn:	21,61	1,32	2,99	0,042
i) Ausscheid. m) Kot:	0,90	0,07	0,47	1,078
	22,51	1,19	3,46	1,12
Verhältniss:	20 :	1 :	3 :	1
o) +1400 H_2O Retent.:	— 10,58	— 2,56 (+ 9,23)	— 1,14	+ 0,38
p) in pCt. d. Aufnahme:	— 90	+ 70 (+ 90)	— 50	+ 25

[Legend:] a) date; b) temperature; c) pulse; d) content in percent; e) amount of urine; f) excretion; g) uring; h) feces; i) nourishment; j) result; k) ratio; l) secretion; m) urine; n) feces; o) retention; p) % of intake.

The observation took place on the last day of fever and two days without fever. Patient was given 11 g common salt during the three days. The feces was analyzed once.

In this case all additional chlorine was retained, because the balance of chlorine is positive even without the salt. The loss of nitrogen was greatest on the day following the crisis. Then it dropped rapidly. The secretion of chlorine sets in on the second day following the crisis, while the secretion of phosphorous comes later. We should like to stress the characteristic sequence once again. The chlorides are the first to react, followed by the slow phosphates. Calcium shows an increased secretion on the day of the crisis, a decrease after the crisis, gradually rising as the chlorides do.

CASE XV

J. K., driver, 26 years old. Pneumonia croup. dextr. l. inf. 7 March 1898.

Anamnesis.

The patient's parents are deceased. Patient had always been in good health except for the childhood diseases. Three years ago his neck glands suppurated. He had his lower jaw glands operated, while the neck glands healed without medical treatment. The process lasted five months. Two years ago he had an attack of malaria which was checked with quinine. The current illness broke out two days ago, accompanied by the typical characteristics.

Status praesens.

No abnormalities in the organs except for the lungs. The blood shows no increase in leucocites. 77% neutrophile, 5.8% large cells, 14.7% small cells, 1.7% transitional forms, 0 eosinophile.

Urine has traces of albumen. Urine sediment shows sparse leucocites. Patient is given 6 g sodium chloride daily.

a) Datum	b) Temp.	c) Puls.	d) Procentgehalt.	e) Harnmenge. ccm	f) Ausgaben. g) Harn.	h) Koth.	i) Nahrung.	j) Resultat.
9. III.	36,8	100	N 1,680	850	14,2875		11,985	− 3,159
0 g	36,9		Cl 0,1953		1,6580	0,857 g N	3,641	+ 1,927 (+ 3,6)
NaCl	36,7		P 0,2021		1,7178		2,316	− 0,665
			Ca 0,0032		0,0272		1,398	− 0,681
10. III	36,7	88	N 2,5300	470	12,178		dto.	− 1,045
	36,7		Cl 0,2062		1,2911			+ 2,334 (+ 3,6)
	36,5		P 0,1105		0,5194	0,0163 g Cl		+ 1,133
			Ca 0,0007		0,0033			− 0,057
11. III	36,8	70	N 2,072	1000	20,720		dto.	− 10,542
dto.			Cl 0,424		4,2400			− 0,655 (+ 2,0)
			P 0,3119		3,1194			− 1,467
			Ca 0,0012		0,0120			− 0,066
12. III	36,5	68	N 1,526	1200	18,312		dto.	− 7,184
dto			Cl 0,6261		7,513			− 3,958 (− 0,8)
			P 0,2803		3,3636	0,0037 g P		− 1,705
			Ca 0,0022		0,0264			− 0,080
13. III	36,4	69	N 1,512	1200	18,144		dto.	− 7,010
dto.			Cl 0,5893		7,0716			− 3,587 (+ 0,1)
			P 0,2301		2,7612			− 1,105
			Ca 0,0050		0,0600	1,4325 g Ca		− 0,090
14. III	36,3	70	N 1,510	1200	18,664		dto.	− 7,530
dto.			Cl 0,5586		7,3785			− 8,746 (− 0,1)
			P 0,3517		4,6424			− 2,990
			Ca 0,0049		0,0647			− 0,119

		g N		g Cl		g P		g Ca
Nahrung:		11,98 (+ 2,0)		3,64		2,52		1,39
		8,5		2,5 (5,0)		1,7		1
k) Ausscheid. 1000 ccm	Harn:	17,05		5,18		2,69		0,028
	Koth:	0,86		0,06		0,66		1,452
	m)	17,91		5,24		3,35		1,42
		12,0	:	3,5	:	2,2	:	1
		− 5,98		(+ 2,0)	− 1,6	− 1,03		− 0,09
		− 50 pCt		(+ 30 pCt.)	− 40 pCt.	− 40 pCt.		− 7 pCt.

[Legend:] a) date; b) temperature; c) pulse; d) content in percent; e) amount of urine; f) excretion; g) urine; h) feces; i) nourishment; j) result; k) secretion; l) urine; m) feces.

All that has been said concerning the preceding case may be repeated here. The diet remained the same throughout. The feces was examined once.

During fever the loss of nitrogen was extremely small, smaller than we have ever witnessed before. A considerable secretion of nitrogen and phosphorous following the fever. Chlorine is secreted in constantly increasing amounts. The phosphorous secretion drops after an initial rise. Calcium shows a minimum on the day of the crisis (the precritical minimum has not been recorded, since the patient voiced criticism on the second day), followed by a constant increase.

CASE XVI

B. H., 32 years old. Pleuropneumonia fibr. dextr. inf.

Anamnesis.

Patient has been healthy in the past. He has had erysipelas on his face five times. The present illness broke out three days ago. In the morning he did not feel well generally and suffered from shivering. Shortly afterwards he was taken to the hospital.

Status praesens.

Except for an infiltration of the right lung, no abnormal findings in the organs except for an infiltration in the right lung. The patient's temperature was 39.5 - 38.0. Pulse 104 - 116. After the crisis the temperature was 36.7 - 36.2. Pulse 70 - 80. The patient inhaled 10 liters oxygen per day.

The diet consisted of the following:

1200 ccm milk,
800 ccm bouillon with egg,
500 ccm water,
500 ccm wine.

After the crisis the following items were added to the above diet: 150 g cutlet or beefsteak, 100-300 g gruel, 400 g bread.

a) Datum.	b) Temp.	a) Puls.	d) Procentgehalt.		c) Harnmenge. ccm	f) Ausgaben g) Harn.	h) Koth.	i) Nahrung.	j) Resultat.
10. Febr.	—	—	N	1,730	800	14,000		7,350	— 6,650
			Cl	0,0364		0,2912		2,640	+ 2,348
			P	0,0739		0,5917		0,794	+ 0,130
			Ca	0,0016		0,0126		0,928	+ 0,697
11. Febr.	39,3	116	N	1,003	1550	24,8465		11,816	— 13,246
	39,1		Cl	0,0303		0,4703		5,455	+ 4,954
			P	0,0781		1,2125		0,953	— 0,301
			Ca	0,0021		0,0317		1,221	+ 0,971
12. Febr.	39,6	124	N	0,900	2000	18,000		14,240	— 3,940
	39,9		Cl	0,0195		0,2494		5,977	+ 5,710
	40,0		P	0,0586		0,7727		1,432	+ 0,587
	39,8		Ca	0,0015		0,0300		1,748	+ 1,495
13. Febr.	39,5	120	N	0,852	2000	17,0400		do.	— 3,010
	39,3		Cl	0,0364		0,7280			+ 5,239
	40,1		P	0,0327		0,6534			+ 0,706
	38,7		Ca	0,0006		0,0128			+ 1,495
14. Febr.	38,8	112	N	0,7525	2000	15,050		14,250	— 1,560
	37,2		Cl	0,0607		1,2156		5,977	+ 4,745
	36,8		P	0,0216		0,4318		1,432	+ 0,563
			Ca	0,0002		0,0044		1,743	+ 0,661
15. Febr.	37,7	88	N	0,805	1800	14,490		29,673	+ 14,187
	36,6		Cl	0,0343		7,047		11,591	+ 4,789
			P	0,0323		0,5858		2,057	+ 1,057
			Ca	0,0010		0,0180		1,925	+ 0,840
16. Febr.	36,8	78	N	0,559	2200	11,858		27,597	+ 14,743
	36,3		Cl	0,455		10,1100		11,262	+ 1,134
			P	0,0364		0,7999		1,874	+ 0,037
			Ca	0,0015		0,0330		1,928	+ 0,812
17. Febr.	36,0	70	N	0,868	2000	17,360		27,985	+ 9,629
	36,6		Cl	0,4489		8,978		12,436	+ 3,440
			P	0,0591		1,1818		1,956	+ 0,837
			Ca	0,0081		0,0162		1,928	+ 0,830
18. Febr.	36,5	80	N	1,3828	1300	17,9764		27,670	+ 8,097
	36,5		Cl	0,6678		8,6770		11,391	+ 2,696
			P	0,0682		0,8863		1,900	+ 0,576
			Ca	0,0091		0,1163		1,928	+ 0,730

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k) I. Periode. 5 Tage.		g N	g Cl	g P	g Ca
3000 H_2O Nahrung:		12,58	5,20	1,21	1,47
l) Verhältniss:		8,2 :	3,5 :	0,8 :	1
m) 2000 H_2O Ausscheid.	n) Harn	17,91	0,58	0,73	0,018
	o) Koth	0,21	0,01	0,07	0,218
		18,12	0,59	0,80	0,236
Verhältniss:		76,9 :	2,6 :	3,4 :	1
p) + 1000 H_2O Retention:		− 5,74	+ 4,61	+ 0,41	+ 1,23
q) in pCt. der Aufnahme:		− 40	+ 50	+ 50	+ 80

II. Periode. 4 Tage.		g N	g Cl	g P	g Ca
3000 H_2O Nahrung:		25,22	11,72	1,96	1,92
Verhältniss:		13,8 :	6,1 :	1 :	1
2000 H_2O Ausscheid.	Harn	15,42	8,72	0,86	0,646
	Koth	0,99	0,02	0,44	1,077
		16,41	8,74	1,30	1,19
Verhältniss:		14,9 :	7,9 :	1,1 :	1
+ 100 H_2O Retention:		+ 11,81	+ 2,98	+ 0,66	+ 0,80
in pCt. der Aufnahme:		+ 42	+ 27	+ 38	+ 40

[Legend:] a) date; b) temperature; c) pulse; d) content in percent; e) amount of urine; f) excretion; g) urine; h) feces; i) nourishment; j) result; k) period - days; l) ratio; m) secretion; n) urine; o) feces; p) retention; q) % of intake.

This case offered the opportunity to study the influence of oxygen inhalation. No essential differences were observed. The secretion of nitrogen is slightly higher than in cases without oxygen. The difference, however, is too slight to draw any conclusions, and might depend on individual differences. The course of the illness, on the other hand, is extremely rapid and benigh, similar to that where a chlorine treatment was applied. A significant amount of chloride is secreted. The increased secretion of phosphorous drops rapidly. Generally speaking, the phosphorous secretion is very low in this case, so that the loss of phosphorous occurred on one day only. The considerable amount of oxygen is, no doubt, responsible for the insignificant loss of nitrogen.

CASE XVII

E. E., 28 years old. Pleuropneumonia sin. inf.

Anamnesis.

Patient comes from a healthy family. Illness broke out three days ago.

Status praesens.

No signs of sickness with exception of the pneumonia. Temperature 39.2. Pulse 110. No fever after the crisis. The diet consisted of milk and bouillon. In addition the patient was given 5 g calcium phosphate and sodium chloride daily. After the crisis he received cutlet with potatoes, or gruel and beefsteak.

1200 ccm milk,
800 ccm bouillon,
500 ccm wine,
500 ccm water,

3000 ccm fluid.

a) Datum.	b) Temp.	c) Puls.	d) Procentgehalt.		e) Harnmenge.	f) Ausgaben d) Harn.		e) Koth.		g) Nahrung.	h) Resultat.	
12. II.	39,2	100	N	1,6855	410	6,9023	0,8295 g N			14,240	+ 6,310	
	38,2	100	Cl	0,0305		0,1249				5,977	+ 5,826	
	39,4	112	P	0,0568		0,2325				1,435	+ 0,740	
			Ca	0,0068		0,0028		0,4625 g P		1,743	+ 1,072	
13. II	38,0	112	N	1,8575	640	11,760				14,240	+ 1,632	
NaCl	38,5	104	Cl	0,0425		0,2718	0,0265 g Cl			5,977	+ 5,733	(+ 3,034)
5 g	36,7	92	P	0,0682		0,4363				1,435	+ 0,537	(+ 2,064)
$Ca_3(PO_4)_2$ 5 g			Ca	0,0026		0,0166	0,0090 g Ca			1,743	+ 1,058	(+ 4,000)
14. II.	36,1	88	N	1,974	1500	29,610				14,240	− 16,192	
	35,0	64	Cl	0,1456		2,184	0,8295 g N			5,977	+ 5,767	(+ 3,034)
	36,1	60	P	0,0881		1,321				1,435	− 0,632	(+ 1,432)
			Ca	0,0015		0,0225	0,4625 g P			1,743	+ 1,052	(+ 4,000)
15. II.	36,0	60	N	1,6205	1000	16,205				14,240	− 2,893	
	36,1	50	Cl	0,4004		4,004	0,0265 g Cl			5,977	+ 1,951	(+ 3,034)
	35,7	50	P	0,0603		0,6079				1,435	+ 0,205	(+ 2,064)
			Ca	0,0010		0,0100	0,0090 g Ca			1,743	+ 1,004	(+ 4,000)
16. II.	35,7	60	N	1,1410	900	10,269				17,366	+ 6,663	
	36,1	50	Cl	0,5704		5,1336	0,2385 g N			8,342	+ 3,209	(+ 2,034)
	35,2	56	P	0,0488		0,4397				1,635	+ 1,192	(+ 2,064)
			Ca	0,0027		0,0253	0,1387 g P			1,823	+ 1,551	(+ 4,000)
17. II.	36,0	56	N	1,1370	1450	17,3565				25,021	+ 0,437	
	35,5	64	Cl	0,6068		8,7986	Spur Cl			10,143	+ 1,395	(+ 3,034)
	36,1	64	P	0,0966		1,4005				1,875	+ 0,822	(+ 2,064)
			Ca	0,0049		0,0811	0,2417 g Ca			1,894	+ 1,566	(+ 4,000)

[continued on next page]

18. II	36,0	52	N 1,0[illegible]2	1500	15,[illegible]		27,[illegible]1	+ 11,467	
	35,7	50	Cl 0,6[illegible]29		9,2[illegible]85		9,787	+ 0,4[illegible]3	(+ 3,034)
	36,4	64	P 0,0841		1,2614		1,[illegible]29	+ 0,515	(+ 2,064)
			Ca 0,0065		0,0075		1,847	+ 1,[illegible]2	(+ 4,000)
19. [illegible]	[illegible]	5[illegible]	N 0,8575	1600	13,720	Spur Cl 0,1[illegible] P / 0,247 Ca 0,[illegible] N	28,968	+ 15,014	
	[illegible]	52	Cl 0,5764		9,2224		10,[illegible]4	+ 1,742	(+ 3,034)
	36,8	60	P 0,0711		1,1379		1,87[illegible]	+ 0,583	(+ 2,064)
			Ca 0,0065		0,1046		1,[illegible]	+ 1,569	(+ 4,000)
20. II	36,2	52	N —	1500	13,3568		28,[illegible]0	+ 14,769	
	36,9	56	Cl —		9,0315		11,861	+ 2,827	(+ 3,034)
	36,6	60	P —		1,0828		1,911	+ 0,675	(+ 2,064)
			Ca —		0,1056		1,965	+ 1,556	(+ 4,000)
21. II	36,6	72	N 0,9625	1350	12,9937		29,928	+ 15,700	
			Cl 0,6553		8,8465		11,557	+ 2,711	(+ 3,034)
			P 0,0761		1,0277		1,919	+ 0,738	(+ 2,064)
			Ca 0,0076		0,1026		1,839	+ 1,491	

k) I. Periode. 5 Tage.	g N		g Cl		g P		g Ca
3000 H_2O Nahrung:	14,24		5,97		1,47		1,75
l) Salze:	—		3		1,00		2
m) zusammen:	14,24		8,97		2,47		3,74
n) Verhältniss:	3,8	:	2,4	:	0,6	:	1
o) ohne Salz:	8,4	:	3,8	:	0,8	:	1
p) Ausscheid. q) Harn:	14,95		2,38		0,57		0,019
1000 H_2O r) Koth:	0,82		0,08		0,16		0,669
	15,77		2,41		0,03		0,69
Verhältniss:	22,5	:	3,4	:	1,4	:	1
s) + 2000 H_2O Resultat:	— 1,53		+ 3,56 (+ 6,56)		+ 0,44 (+ 1,44)		+ 1,03 (3,08)
in pCt.:	— 10		60 (100)		40 (60)		70 (80)

II. Periode. 5 Tage.	g N		g Cl		g P		g C
3000 H_2O Nahrung:	27,98		10,87		1,90		1,87
	14,9	:	5,7	:	1	:	1
t) mit Salz:			13,87		2,90		3,87
	4,8		2,4		0,6		1
Ausscheid. Harn:	14,55		9,07		1,18		0,097
1500 H_2O Koth:	0,23		—		0,15		0,245
	14,78		9,07		1,33		0,34
	43	:	27	:	4	:	1
+ 1500 H_2O Resultat:	+ 13,20		+ 1,80 (+ 4,80)		+ 0,57 (1,57)		+ 1,53 (+ 3,53)
in pCt.:	+ 50		+ 17 (+ 30)		+ 26 (50)		+ 85 (96)

[Legend:] a) date; b) temperature; c) pulse; d) content in percent; e) amount of urine; f) excretion; g) urine; h) feces; i) nourishment; j) result; k) period - days; l) salt; m) together; n) ratio; o) without salt; p) secretion; q) urine; r) feces; s) result; t) with salt.

This case -- as well as the subsequent case -- clearly show the favorable influence of good nourishment. In this case we also intended to study the effect of sale during a considerable intake of nitrogen. It appears that with additional salt the loss of nitrogen is lower both during

fever and during the absence of fever. After the fever the diuresis is the same in both cases, yet case XVII looses only 10% nitrogen, case XVII without salt looses 60%; during convalescence the patient under salt treatment gains 50% nitrogen, the other one only 30%, although in the second case the nourishment contained 3 g more nitrogen. A loss of phosphorous occurred only on one day, while in the other case it lasted seven days. A two-day loss of nitrogen amounted to 19 g; in the other case 61 g were lost in eight days. The maximum losses are greater without salt (17 g nitrogen per day as compared to 16 g).

The salt had a favorable effect on the bowel excretion. During fever and during the convalescence period the nitrogen content in the feces remains low: 0.8 g per day during fever, 0.2 g after the fever. With the same diet, the other case shows 3 g per day during fever, 1.2 g after the fever.

CASE XVIII

U. A., 32 years old. Pleuropneumonia fibr. dext.

Anamnesis.

No significant incidents in patient's history or family. Patient fell ill five days ago and was put to bed shortly afterwards. Taken to the hospital several days later because of better case.

Status praesens.

Apart from the lung infiltration, no abnormalities in the other organs. Temperature 40-38. Pulse 128-100. Patient had fever after the crisis. Temperature 36, pulse 70.

The diet consisted of the following:

1200 ccm milk,
800 ccm bouillon,
500 ccm water,
500 ccm wine.

After the crisis he received the following:

cutlet or beefsteak -- 150 g; gruel or potatoes -- 100-300 g; bread -- 400 g.

a) Datum.	b) Trink-	c) Fut-	d) Prozent-Gemalt.	e) Trink- menge ccm	f) Ausgaben g) Harn.	h) Kot.	i) Nahrung	j) Resultat
8. Febr.	40,0	128	N 1,50	1000?	15,950		14,240	4,0188
	39,8	128	Cl 0,0581		0,961		5,977	+ 5,265
	39,4	124	P 0,5185		0,455		1,855	0,511
			Ca 0,0057		0,0570		1,743	0,051
9. Febr.	39,5	120	N 1,5100	1550	20,500		do.	9,748
	39,0	112	Cl 0,0067		0,1502	P 1,8854 g		+ 5,095
	38,8	92	P 0,0807		0,0792	Ca 1,8176 „		1,142
			Ca 0,0033		0,0041			0,078
10. Febr.	—	—	N 1,0620	1550	21,0020		do.	10,266
			Cl 0,10015		1,0052	N 3,1662 g		+ 4,523
			P 0,08587		1,3067	Cl 0,0005 „		1,215
			Ca 0,0001		0,0015			0,076
11. Febr.	36,7	88	N 1,8845	700	13,2015		14,240	- 2,149
	36,6	84	Cl 0,0607		0,4247		5,977	+ 5,492
	36,7	80	P 0,1022		0,7159		1,455	0,859
			Ca 0,0055		0,0685		1,743	- 0,012
12. Febr.	36,0	76	N 1,855	1000	22,680		do.	- 18,658
	36,3	76	Cl 0,2245		3,592			+ 2,625
	36,8	92	P 0,0903		1,1546	P 1,4854 g		+ 1,408
			Ca 0,0026		0,0416	Ca 1,8170 „		- 0,116
13. Febr.	36,2	100	N 1,505	1500	22,575		do.	- 17,520
	36,1	84	Cl 0,5056		7,5419			- 1,662
	36,6	92	P 0,1136		1,7016	N 3,1662 g		+ 1,758
			Ca 0,0025		0,0385	Cl 0,0005 „		0,112
14. Febr.	36,0	96	N 1,2505	1450	18,1573		17,773	- 6,851
	36,3	84	Cl 0,5103		7,4054		6,566	1,482
	36,6	80	P 0,1052		1,5249		1,582	1,578
			Ca 0,0026		0,0383		1,747	- 0,111
15. Febr.	36,5	84	N 1,5445	1600	25,622		32,054	+ 5,877
	36,5	80	Cl 0,5825		9,329		13,241	+ 3,729
	37,0	84	P 0,1661		2,6566		2,149	+ 1,529
			Ca 0,0036		0,0576		2,031	- 0,211
16. Febr.	36,2	76	N 1,295	1700	22,015		25,048	+ 1,956
	36,8	72	Cl 0,6724		11,435		9,713	- 1,764
	37,3	68	P 0,0852		1,5844		1,698	+ 1,063
			Ca 0,0032		0,0544	N 1,6350 g P 1,0214 g	1,848	0,350
17. Febr.	36,6	60	N 1,218	1600	19,488	Cl 0,1022 „ Ca 2,1811 „	27,208	+ 6,180
	37,2	76	Cl 0,7281		11,6496		10,810	- 1,001
	38,5	60	P 0,0852		1,3656		1,975	- 0,410
			Ca 0,0052		0,0832		1,919	+ 0,348
18. Febr.	36,8	68	N 0,8860	1800	17,6400		30,259	+ 11,324
	37,0	64	Cl 0,6189		11,1402		11,331	+ 0,029
	36,9	100	P 0,07103		1,2785		1,934	0,366
			Ca 0,0050		0,0200		1,958	- 0,336
19. Febr.	36,8	64	N 1,0760	1750	18,875		29,151	+ 9,171
	36,4	76	Cl 0,6492		11,361		12,586	+ 1,063
	36,5	80	P 0,0671		1,1734		1,992	0,202
			Ca 0,0052		0,0310		1,925	0,350
20. Febr.	36,9	72	N 0,8435	1600	15,061		30,867	+ 14.168
	36,8	76	Cl 0,6535		10,4849		11,784	+ 1,137
	37,0	68	P 0,0653		1,0174		1,956	0,101
			Ca 0,0076		0,1211		1,926	- 0,379

k) I. Periode. 7 Tage.	g N	g Cl	g P	g Ca
5000 H_2O Nahrung:	14,24	5,07	1,43	1,74
l) Verhältniss:	8,4 :	3,5 :	0,8 :	1
m) 1200 H_2O Ausscheid. { Harn n)	5,25	5,10	1,15	1,624
{ Koth o)	9,13	0,06	1,43	1,56
	25,45	8,16	2,05	1,84
Verhältniss:	13,0 :	1,7 :	1,4 :	1
p) + 1700 H_2O Retention:	− 9,21	+ 2,91	− 1,22	− 0,10
q) in pCt. der Aufnahme:	− 60	+ 40	− 50	− 9

II. Periode. 6 Tage.	g N	g Cl	g P	g Ca
5500 H_2O Nahrung:	29,25	11,37	1,92	1,92
Verhältniss:	15,0 :	5,9 :	1 :	1
1700 H_2O Ausscheid. { Harn	17,77	10,88	1,51	0,082
{ Koth	1,64	0,16	1,02	2,184
	19,41	11,04	2,53	2,266
Verhältniss:	8,5 :	4,8 :	1,1 :	1
+ 1800 H_2O Retention:	+ 9,84	+ 0,33	− 0,61	− 0,34
in pCt. der Aufnahme:	+ 34	+ 4	− 30	− 17

[Legend:] a) date; b) temperature; c) pulse; d) content of percent; e) amount of urine; f) excretion; g) urine; h) feces; i) nourishment; j) result; k) period - days; l) ratio; m) secretion; n) urine; o) feces; p) retention; q) % of intake.

The secretion shows the typical characteristics. The rise of temperature is particularly clear after the crisis. After the disappearance of fever there is a sudden drop in the secretion of N, P, and Cl followed by an increase which exceeds the number of fever days.

From then on a gradual drop of nitrogen and an increase in the chlorine secretion set in. The secretion of phosphorous keeps increasing and outlasts the nitrogen maximum by one day; only then it begins to decrease. Calcium shows the pre-critical minimum, increases on the first day without fever, then drops only to increase gradually to the normal point of secretion.

The nitrogen content in the feces is high during fever, normal after fever. The chlorine content in the feces is lower during fever than afterwards. The phosphorous content is very high and close to calcium: 14:18=P:Ca. It drops with the absence of fever, barely reaching one half of the calcium secretion: 10:21=P:Ca.

All this is a pattern of pneumonia, a pattern which is seldom achieved, but which may be detected in every case as a paradigm.

Survey Table 1

Fall.		① Ausscheidung p. die: N	Cl	P	Ca	② Ausscheidung N	Cl	③ pro die: P	Ca	④ Verlust (−) und Gewinn (+) pro die: N	Cl	P	Ca	⑤ Wasser: ① Aufnahme	② Ausscheidung	③ Bilanz
I.	1. [a] Zucker [c] Fieber	0	0,79	0	0,72	19,77	0,42	1,08	0,05	− 19,77	+ 0,37	− 1,08	+ 0,66	2000	1100	+ 1000
II.	2. Fieber	2,41	0,53	0,38	0,51	20,11	0,92	1,11	1,00	− 18,0	− 0,45	− 0,73	− 0,51	1000	1100	+ 1000
III.	3. 5 g KCl Fieber	2,08	1,08 (4,06)	0,77	0,81	18,59	0,88	2,01	1,12	− 16,61	+ 0,20 (+ 3,03)	− 1,24	− 0,31	2000	900	+ 1200
	4 Fieber	4,82	1,07	0,77	1,03	21,90	1,81	1,54	0,98	− 17,15	− 0,75	+ 0,58	+ 0,1	2000	1200	+ 1000
IV.	5. [a] Zucker Fieber	4,89	2,31	1,24	1,21	20,70	0,40	1,32	0,170	− 15,85	+ 1,91	− 0,08	+ 1,01	2000	1000	+ 1200
	[f] fieberfrei	4,89	2,54	1,24	1,21	15,82	1,39	1,89	0,46	− 9,02	+ 0,95	− 0,65	+ 0,74	2000	700	+ 1000
V.	6. $AgNO_3$ Fieber	5,38	2,12	1,17	1,44	27,74	0,16	1,65	1,33	− 22,53	+ 1,96	0,68	+ 0,11	1100	1100	+ 1000
VI.	7. [a] Zucker Fieber	5,61	3,07	1,53	1,18	15,41	0,05	0,58	0,01	− 9,77	+ 3,02	+ 0,95	+ 1,17	1900	1000	+ 900
VII	8. NaCl, $Ca_3(PO_4)$ Fieber	5,76	2,58	0,50	0,61	24,26	0,33	0,90	0,03	− 18,49	+ 2,25	− 0,40	+ 0,58	2000	2000	+ 2000
VIII	9. Fieber	5,77	2,58	0,59	0,61	18,56	0,15	1,00	0,007	− 12,79	+ 2,43	− 0,59	+ 0,53	2000	900	+ 1100
IX	10. 10 g NaCl Fieber	6,01	1,64 (8,21)	1,27	1,55	25,83	5,15	3,07	0,59	− 19,79	− 0,51 (+ 0,07)	− 2,10	+ 0,66	2000	1200	+ 800
X.	11. $Ca_3(PO_4)_2$ 10 g Fieber	6,30	2,10	1,33 (3,33)	1,57 (5,57)	25,82	0,70	2,05	2,03	− 19,52	+ 1,40	− 1,72 (+ 0,61)	− 1,01 (+ 3,01)	2300	1100	+ 1200
XI.	[b] 12. Nucleinsäure Fieber	6,30	2,10	1,33	1,57	16,70	0,05	0,48	0,024	− 10,40	+ 2,07	+ 0,85	+ 1,54	—	800	—
	13. $Ca_3(PO_4)_2$ 10 g fieberfrei	7,07	3,18	1,65 (3,65)	1,37 (5,17)	18,05	2,85	2,48	2,44	− 10,98	+ 0,33	− 0,83 (+ 1,23)	− 1,07 (+ 2,50)	1700	1900	− 200
XII	14. 10 g NaCl Fieber	7,56	1,98 (8,03)	1,59	1,76	15,52	1,01	2,29	1,17	− 8,26	+ 0,97 (+ 7,04)	− 0,70	+ 0,59	2500	900	+ 1400
	15. KCl 5 g fieberfr.	7,65	2,58 (4,56)	1,93	0,89	14,83	2,61	2,27	1,43	− 7,18	+ 0,03 (+ 2,55)	− 1,01	+ 0,54	1400	900	+ 500
	16. 10 g NaCl fieberfrei	9,77	2,56 (8,09)	1,95	1,57	25,19	2,82	3,23	1,24	− 12,42	+ 0,01 (+ 6,11)	− 2,02	+ 0,33	2500	1200	+ 1200

[continued on following page]

XIII.	17.	(Wasser)	Fieber	10,24	3,41		2,12	1,46	21,69	0,65	1,97	0,85	− 11,56	+ 2,76	+ 0,15	+ 0,61	2200	1200	+ 2000
			fieberfrei	10,24	3,41		2,12	1,46	21,66	2,01	1,48	2,61	− 11,42	+ 1,46	+ 0,64	+ 1,18	2100	1700	+ 600
	18.		fieberfrei	11,27	2,85		1,85	1,85	23,36	3,24	2,37	0,77	− 10,00	− 0,39	− 0,52	+ 0,58	2600	1600	+ 1000
XIV.	19.	10 g NCl	Fieber	11,98	3,75	(10,42)	2,32	1,50	22,51	1,19	3,46	1,12	− 10,53	+ 2,56 (+ 9,23)	− 1,14	+ 0,38	2500	1100	+ 1400
XV.		6 g NaCl	Fieber	11,98	3,64	(7,24)	2,32	1,39			5,21	3,05	1,48	− 5,93	− 1,60 (+ 2,09)	− 1,03	− 0,09	2000	1000	+ 1000
XVI.	21.	0 Athmen	Fieber	12,58	5,20		1,21	1,47	18,19	0,52	0,89	0,24	− 5,74	+ 4,61	+ 0,41	+ 1,23	2000	2000	+ 1000
	22.		Fieber	13,34	5,19		1,50	1,03	17,92	1,94	3,00	0,93	− 4,55	+ 2,25	− 0,51	+ 0,51	2500	1200	+ 1300
	23.	10 g NaCl	fieberfrei	13,75	3,68	(10,52)	2,14	1,55	20,84	10,05	4,51	1,176	+ 7,09	− 3,37 (+ 0,27)	− 2,75	+ 0,38	2000	1700	+ 300
XVII.	24.	$NaCl, Ca_3(PO_4)_2$	Fieber	14,24	5,97	(8,56)	1,47 (2,47)	1,74 (3,71)	15,77	2,41	1,63	0,69	− 1,53	+ 3,56 (+ 6,56)	+ 0,44 (+ 1,44)	+ 1,01 (+ 3,63)	3000	1000	+ 2000
XVIII.	25.		Fieber	14,24	5,97		1,43	1,74	23,45	3,16	2,65	1,81	− 9,21	+ 2,81	− 1,22	− 0,10	2000	1200	+ 1500
	26.	$NaCl, Ca_3(PO_4)_2$	fieberfrei	16,31	5,78	(8,75)	1,43 (2,43)	1,61 (3,61)	13,51	5,17	1,45	0,86	+ 2,47	− 2,30 (+ 0,63)	− 0,05 (+ 0,95)	+ 0,58 (+ 2,58)	2500	2000	+ 500
	27.		fieberfrei	19,45	7,03		1,70	1,78	17,59	8,57	2,22	2,48	+ 1,86	− 1,46	− 1,61	− 1,70	2000	1700	+ 300
	28.		fieberfrei	20,29	7,62		1,50	1,79	16,05	6,11	1,71	0,156	+ 4,25	+ 1,58	+ 0,16	+ 1,24	2000	1500	+ 500
	29.		fieberfrei	27,98	10,87	(13,87)	1,99 (2,99)	1,87 (3,87)	11,78	9,67	1,51	0,34	+ 13,20	+ 1,50 (+ 4,50)	+ 0,57 (+ 1,57)	+ 1,53 (+ 3,53)	3000	1500	+ 1500
	30.	0 Athmen	fieberfrei	28,22	11,72		1,36	1,92	16,41	8,76	1,70	1,12	− 11,61	+ 2,28	+ 0,66	+ 0,88	3000	2000	+ 1000
	31.		fieberfrei	29,25	11,57		1,91	1,92	19,41	11,01	1,48	2,27	+ 9,44	+ 6,53	− 0,61	+ 0,24	2900	1700	+ 1200

[Legend:] 1) secretion per day; 2) loss and gain per day; 3) water; 4) intake; 5) secretion; 6) balance; a) sugar; b) nucleic acid; c) water; d) respiration; e) fever; f) absence of fever.

Survey Table II

Fall.			① Verhältnisse in der Nahrung: N	Cl	P	Ca	② Verhältnisse in der Ausscheidung: N	Cl	P	Ca	③ Verlust (−), Gewinn (+) in pCt. der aufgenommenen Nahrung: pCt. N	pCt. Cl	pCt. P	pCt. Ca
I.	1. Zucker a)	c) Fieber	0	1	0	1	201	0,9	1,1	1	—	+ 45	—	+ 99
II.	2.	Fieber	4,7	1	0,7	1	(320	7	18	1)	— 750	— 90	— 1[illegible]	— 80
III	3. 5 g KCl	Fieber	3,6	2 (5)	0,9	1	16,8	0,8	1,8	1	— 500	+ 50 (+ [illegible])	— 1[illegible]	— 40
	4.	Fieber	4,7	1	0,7	1	22	1,7	1,4	1	— 850	— 74	— 8[illegible]	+ 10
IV.	5. Zucker	Fieber	4	2	1	1	122	2	8	1	— 500	+ 99	— 7	+ 89
		f) fieberfrei	4	2	1	1	83	3	4	1	— 150	+ 49	— 69	+ 69
V.	6. $AgNO_3$	Fieber	8,8	1,5	0,8	1	21,4	0,1	1,4	1	— 400	+ 98	— 57	+ 9
VI.	7. Zucker	Fieber	4,7	2,5	1,2	1	(1541	5	58	1)	— 150	+ 100	—	—
VII.	8. NaCl, $Ca_3(PO_4)_2$	Fieber	9,4	4,3	0,8	1	(700	9	28	1)	— 300	+ 90	— 9[illegible]	+ 99
VIII.	9.	Fieber	9,6	4,3	0,8	1	185	1,5	10	1	— 220	+ 90	— 11[illegible]	+ 8[illegible]
IX.	10. 10 g NaCl	Fieber	4,2 (1,2)	1,5 (0,4)	0,9 (0,5)	1	9	0,3	1,2	1	— 300	— 30 (+ 70)	— 1[illegible]	+ 41
X.	11. $Ca_3(PO_4)_2$ 10 g	Fieber	4,2	1,5	0,8	1	(600	1,4	20	1)	— 300	— 30	— 15[illegible] (+ 10)	— 60 (+ 69)
XI	12. Nucleinsäure b)	Fieber	6	1,1 (5,5)	0,8	1	26	2	3,8	1	— 170	+ 90	+ 69	+ 90
	13. $Ca_3(PO_4)_2$ 10 g	fieberfrei	5,9 (1,4)	2,6 (0,6)	1,4 (0,7)	1	7,5	1,1	1	1	— 150	+ 45	— 50 (+ 40)	— 110 (+ 59)
XII.	14. 10 g NaCl	Fieber	4,4	1,1 (5)	0,9	1	15	0,9	2	1	— 110	(+ 90) + 12	— 50	+ 84
	15. KCl 5 g	fieberfrei	8,5	2,9 (5,6)	1,5	1	10	1,7	1,6	1	— 90	— 10 (+ 5[illegible]	— 59	— 69
	16. 10 g NaCl	fieberfrei	6,5	1,9 (6)	1,2	1	19	2,3	4	1	— 125	+ 1 (+ 70)	— 15[illegible]	+ 92

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XIII.	17. (Wasser) e)	Fieber	7 : 2,4 : 1,5 : 1	24 : 0,7 : 2,2 : 1	— 110	+ 50	+ 7	+ 40
		fieberfrei	7 : 2,4 : 1,5 : 1	7 : 0,7 : 0,6 : 1	— 110	+ 40	+ 30	— 80
	18. AgN₃	fieberfrei	8,5 : 2,2 : 1,4 : 1	28 : 4 : 3 : 1	— 50	— 13	— 30	+ 40
XIV.	19. 10 g NCl	Fieber	7,9 : 2,5 (7) : 1,5 : 1	20 : 1 : 8 : 1	— 20	+ 70 (90)	— 50	+ 15
XV.	20. 5 g NaCl	Fieber	8,5 : 2,5 (5) : 1,7 : 1	12 : 3,5 : 2,2 : 1	— 50	+ 40 (80)	— 40	— 7
XVI.	21. O-Athmen d)	Fieber	8,2 : 3,5 : 0,5 : 1	78,9 : 2,6 : 3,4 : 1	— 40	+ 90	+ 30	+ 50
	22.	Fieber	8,3 : 3,2 : 0,9 : 1	179 : 19 : 19 : 1	— 35	+ 65	— 35	+ 22
	23. NaCl 10 g	fieberfrei	9 : 2,4 (7) : 1,5 : 1	19 : 9 : 4 : 1	— 5	— 100 (+ 20)	— 110	+ 27
XVII.	24. NaCl, $Ca_3(PO_4)_2$	Fieber	8,4 (8,8) : 3,8 (2,4) : 0,5 (0,6) : 1	22,5 : 3,4 : 14 : 1	— 10	+ 60 (100)	+ 40 (60)	+ 70 (+ 80)
XVIII.	25.	Fieber	8,4 : 3,5 : 0,8 : 1	18 : 1,7 : 1,4 : 1	— 60	+ 40	— 20	— 9
	26. NaCl $Ca_3(PO_4)_2$	fieberfrei	10 (8) : 3,6 (2,5) : 0,2 (0,6) : 1	16 : 9 : 1,6 : 1	+ 15	+ 8 (— 47)	— 4 (+ 70)	+ 40 (+ 80)
	27.	fieberfrei	11 : 4 : 1 : 1	7 : 3,6 : 1 : 1	+ 10	— 20	— 20	— 20
	28.	fieberfrei	8,8 : 3,2 : 0,9 : 1	164 : 41 : 9 : 1	+ 20	+ 20	+ 10	+ 70
	29. d)	fieberfrei	14,9 (4,8) : 5,7 (2,4) : 1 (0,6) : 1	43 : 27 : 4 : 1	+ 50	+ 17	+ 28	+ 83
	30. O-Athmen	fieberfrei	14,8 : 6,1 : 1 : 1	14,9 : 7,9 : 1,1 : 1	+ 48	+ 27	+ 38	+ 40
	31.	fieberfrei	15 : 5,5 : 1 : 1	8,3 : 4,3 : 1,1 : 1	+ 31	+ 4	— 30	— 17

[Legend:] 1) ratio in nourishment; 2) ratio in secretion loss; 3) gain in percent of intake; a) sugar; b) nucleic acid; c) water; d) respiration; e) fever; f) absence of fever.

In concluding we would like to recapitulate the most important results in as far as these have not been discussed in the individual cases. At first we intend to state the figures, then discuss the conclusions.

The secretion of nitrogen varies greatly during fever. The nitrogen figures change not only from case to case; one individual who is on the same diet secretes varying amounts of nitrogen. In one case we witnessed a periodic tendency: every second day the amount of nitrogen was great, on other days it was low (the acidic phosphates fluctuated as well, exceeding the basic phosphates on one day, staying behind them the next day). Otherwise the variations were irregular. The amounts secreted varied greatly. The same patient may secrete 7 g daily and the increase to 31 g two days later. The lowest figure was 6 g per day, the highest -- 43 g nitrogen (not urine). The average figures are between 15 and 27 g per day.

Almost always immediately after the crisis an increase in the nitrogen secretion was witnessed. This increase may recur, only to be followed by a gradual decrease.

The secretion of nitrogen during fever does not depend on the intake of nitrogen; that is, in spite of little nourishment the patient eliminates a great deal of nitrogen. On the other hand, the secretion of nitrogen cannot be increased by a greater intake.

Water and chloride can increase the nitrogen secretion. Sugar decreases it. Small amounts of common salt and a mixture of common salt and calcium phosphate also decrease the nitrogen secretion.

The secretion of nitrogen through the bowels is usually greater during fever than at other times. The amount of nourishment does not seem to have an obvious effect. We intentionally use the term "bowel excrement", because it must be determined how much of the nitrogen in the feces comes from nourishment which has not been absorbed, and how much may be regarded as a bowel secretion. In any case, all salts effect a decrease of bowel nitrogen.

The loss of nitrogen during fever depends on nourishment; that is, the more nitrogen is supplied, the smaller the loss.

This observation has already been made by many others, and we witnessed it in all the cases. The general table,

which has been arranged according to the quantity of nitrogen, illustrates it clearly. It would hardly be necessary to stress the fact that the same rule applies to the convalescence period if a recent article by Benedikt (Munchener med. Wochenschrift (Munich Medical Weekly), 1899, No 7, page 220) had not appeared where the author deals with nitrogen secretion in typhoid and gives therapeutic hints. Benedikt states that the nitrogen content in the food intake might be reduced during typhoid fever in order to get the cells used to a weak diet. This would cause a greater nitrogen increase after the fever. The great nitrogen retention which follows the fever is explained by Benedikt as a result of adapting the cells to a nitrogen-poor diet. Our tables clearly indicate that a diet which is rich in nitrogen during fever does not exclude the possibility of great nitrogen retention after fever. On the other hand, a meagre fever diet by no means guarantees greater retention of nitrogen after fever. Our figures do not support the therapy advocated by Benedikt.

The relationship of nitrogen to the chloride secreted varies greatly. The amount of nitrogen may be twice as large as that of chlorine, but with a strong chlorine retention, the nitrogen amount may be 500 times as strong.

The ratio of nitrogen to phosphorous is far more constant. While the intake may contain 10 - 5 g nitrogen for 1g of phosphorous, the nitrogen increases in the secretion almost regularly to 15 - 20 g for 1g of phosphorous. Only those cases differ where chloride is added to the nourishment. Here the ratio corresponds to that in the intake, or even changes in favor of phosphorous, that is, P:N = 1.5.

The secretion of chloride during fever is too well known to be repeated once again. It should perhaps only be stressed that the secretion of chlorine does not increase immediately after the drop in temperature; it goes down before coming up again. This corresponds to the post-fever increase of nitrogen and phosphorous in the urine.

Unlike nitrogen, the secretion of chlorine depends on the quantity of chlorine contained in the nourishment. This does not mean that a tenfold increase in the intake would increase the secretion ten times; however, it may be stated with great certainty that the greater the chlorine content in the nourishment, the more chlorine appears in the secretion products. Thus, for example, 1g in the intake is followed by 0.5 g in the secretion; 8 g in the intake, by

2-3 g in the secretion daily. The increase, of course, is slight.

The secretion of chlorine through the bowels is insignificant. Sometimes it is stronger during fever, at other times it is weaker than during the absence of fever. Often the quantity of salt given had absolutely no effect on the quantity of chlorine in the feces. Sometimes it increased the chlorine content, as for instance, instead of 0.06 per day to 0.7 per day.

During the entire period we witnessed a loss of chlorine during fever only three times: twice in cases of very low food intake, once in a case where calcium phosphat was given which had a great diuretic effect. Otherwise the loss of chlorine may be expected with the absence of fever, but even there is not always pronounced and may stretch over a long period of time. We see a real loss of chlorine in cases where patients are given chloride and phosphate. We called such cases shortened convalescence.

The retention of chloride does not depend greatly on the quantity in the intake. Whether 10 g of chlorine are added to the nourishment or not, the retention fluctuates around 90% of the intake. We stressed the opposite in our discussion of nitrogen: the greater the amount of nitrogen in the nourishment, the smaller the loss. This is not the case with chlorine, where the retention remains constant regardless of the varying amounts in the intake.

The above may be formulated as follows: the organism must secrete a specific amount of nitrogen, but not a specific amount of chlorine. Consequently, the organism benefits from all excess nitrogen supplied, but secretes all surplus chlorine.

In other words, the organism has a specific concentration for chloride, but none for nitrogen.

This gives rise to the question what might cause the retention of chlorine. The opinion expressed by Carl Schmidt in 1850 seems to have the greatest validity in this respect. Chlorine is retained when the organism becomes serious. E. Schwarz (Wiener med. Blatter, 1895, No 49, 50 51) believes that chloride takes the place of phosphate which had been secreted. It seems hardly possible, however, that 2-3g chloride were necessary to substitute for 1g phosphorous. In such a case, the addition of chloride should diminish the

retention, yet it is increased without exception. The organism can retain 3 and 9g chlorine, yet 1g of chlorine would be sufficient if it were a question of taking the place of phosphate. It is correct, nonetheless, that the addition of chlorine effects the secretion of phosphorous. We intend to go into the causes in our discussions of phosphorous.

The action of phosphorous during fever was quite rightly compared to that of nitrogen. There is absolutely no phosphorous. Numerous metabolism tests in animals and humans have already clearly proved this point. The secretion parallels the fluctuations of nitrogen, and after the crisis we inevitably find a considerable increase in the secretion which decreases very gradually. The increase in phosphate applies to the acidic phosphates. This has been proved both directly through experiments and indirectly through changes in earth phosphate. Phosphate leaves the organism through the bowels as well, for the P content in the feces is usually higher during fever than during the convalescence period. Through the bowels the patient looses approximately 0.7 - 0.4 g P per day, through urine 1 - 3g per day.

The retention of phosphorous was witnessed rarely. In one case a generous amount of sugar had been added to the diet. There the nitrogen loss was also very slight. Another instance was a fatal case of pneumonia, where the patient had been given 1g nucleic acid daily. One case had been treated with oxygen, another salts.

As in the cases of nitrogen, the secretion of phosphorous during fever is influenced by the nourishment. It is, however, subject to great fluctuations which must have given rise to the opinion that phosphate is retained during fever. As already mentioned, sometimes a retention or balance of phosphorous may be achieved, particularly when calcium phosphate or calcium phosphate and common salt are added. Otherwise even the losses fluctuate between -190% and -7% of the intake, apart from the retention which may reach +40%. However, if large amounts of chloride are added to the intake, the result is always a considerable increase in the secretion of phosphorous. It may be possible that phosphate, which stems from decomposed albumen, is absorbed by the serious organism like chloride, and appears in its true quantity only if there is enough chloride in order to preserve ton concentration of lymphs. This assumption is supported by the similarity of nitrogen and phosphorous. The amount

of phosphorous secreted is usually greater than the intake, yet if chlorine is added, this disproportion disappears. We mentioned before that if the intake contains 5 - 10 g N to 1g P, the secretion during fever amounts to 10 - 20 g N. What happens to the phosphorous? There is no doubt that the amount in the secretion has increased, but this increase is too low when compared to that of nitrogen. All of the phosphorous accompanying the nitrogen is not secreted. Consequently, we must make the simplest assumption that phosphate shares the fate of chloride in being absorbed. The amount of chlorine retained is too small to reach saturation. In fact, there is no reason why the soluble phosphate should act differently from chloride. Only if chloride is added, a proportionate amount of phosphate is secreted; now we find 1g phosphorous to 5 g nitrogen, which is the amount proportionate to the intake.

Modern chemical theories make it easy to explain why chloride is more easily absorbed than phosphate, and why chloride is retained and phosphate secreted when both are present at the same time. The dissociation of phosphoric acid which is marked by conductivity (Ostwald, Allgemeine Chemie (General Chemistry), Vol II, pages 658 & 650. Leipzig 1893.), as well as its activity coefficient are far behind hydrochloric acid. HCla = 0.90, H_2PO_4a = 0.08 (Activity), conductivity HCl -- 100.00, H_2PO_4 -- 7.28.

The activity coefficient is obtained from the ratio of actually decomposed molecules to the total number of molecules, so that the low activity at the same time expresses the low decomposition of molecules. This is in accord with the chloride and phosphate in the organism, and explains while the small common salt molecules are much more easily absorbed as ions than phosphates which exist as ions only in small amounts.

The addition of calcium phosphate to the food does not always produce an increase in the secretion; the influence, nevertheless, is visible.

A ratio of phosphorous to chlorine cannot be found. It may be stated, however, that the secretion of phosphate exceeds that of chloride during fever, although the nourishment contains more chloride.

The secretion of calcium salt, like that of chloride, decreases during fever. This has been confirmed through careful calculation in almost all of our cases. The secretion in the urine and in the feces decreases considerably.

It is possible that the sparse bowel excretion is caused by the decrease in the bowel secretion. When gall secretion decreases during fever, (Pisenti, Arichiv fur exp. Path. und Pharm. (Archives of experimental Path. and Pharm.), Vol 21, p 219) other bowel secretion is possibly decreased at the same time. We found accordingly that calcium hardly exceeded phosphorous in the feces during fever, while after the fever it was twice as great as phosphorous. Under normal circumstances the amount of calcium is double that of phosphorous, because for 1g P there are 2g Ca in calcium phosphate, which is the form in which calcium leaves the organism. The fever secretion does not contain a neutral calcium phosphate, but rather a mixture of acidic $CaHPO_4$ and $Ca_2(H_2PO_4)$ 2, or only the acid containing 80Ca to 62P which is close to the figures found during fever. Calcium is then retained instead of being secreted in small amounts. This holds true for the urine as well, according to our figures.

In our earlier articles dealing with changes in the blood and metabolism in anemia, we compared the retention of calcium with that of chlorine, and the assumption seems probable in this case as well, that calcium is absorbed by the lymphs in the organism. Approximately 80% of the calcium supplied is retained consistently. The secretion of calcium increases during convalescence. Interesting is the fact that the calcium secretion in the urine reaches a sudden minimum before the crisis. This does not always become immediately clear, as the minimum often coincides with the day of the crisis. This fact is interesting, because calcium is the element to do so. Phosphorous, nitrogen, chlorine never react in this manner. Therefore it may be assumed the calcium reacted similarly to the fever as nitrogen. In one case we have the pre-fever rise, in the other case the pre-critical drop. It is of course difficult to determine whether the formation of new elements or of a new type of albumen takes place. After the crisis we sometimes find an increase in the calcium secretion, then a decrease for one day, only to give way to a constrant rise. The addition of chloride to the food effects an increased secretion of calcium; consequently, chloride substitutes for calcium salt.

The ratio of calcium to chlorine in the intake usually differs from that in the secretion. There is more calcium in the secretion and more chlorine in the intake. This observation supports the view that the organism primarily retains chloride, then calcium phosphate, and only then the alkali phosphates.

The few observations we have made concerning the secretion of magnesium justify only the one conclusion that

there is an increase in the magnesium secretion during fever, and that the amount contained in the urine decreases after the crisis.

Very little magnesium is secreted through the bowels; most of it leaves the organism through the kidneys.

These are the results of our work. In drawing practical conclusions, we should point out the great importance of an ample nitrogen supply. Although the necessity of a proper diet has been proved in a number of old and recent experiments (Hosslin, Buss, Leyden, Klemperer), Benedikt's article contains some doubts in this matter. We feel justified in dismissing his doubts entirely, because both the outcome of fever and convalescence have been far more favorable with sufficient nitrogen in the diet. A further question is whether the decomposition of albumen could be checked through other means. Sugar is probably the best sparing agent as shown by May (Zeitschrift fur Biologie (Biology Periodical) Vol 30, page 16). Our experiments confirm this view. Sugar decreases the urine secretion, effecting a smaller loss of nitrogen and extending the convalescence period. Fat should not be substituted for sugar (although Von Noorden suggests this due to the high calorie content), because fever has a worse effect on the patient when the fat content increases and albumen decreases (Senator). The capacity of the cell to decompose albumen, the loss of this capacity, or the strengthening of the capacity, are expressions which mean nothing.

If we wish to study processes which take place during fever, we must stick to the facts. It is a fact that water is absorbed and dilutes the organs -- this shows in the water and salt retention which have been proved many times. Are we not aware of processes which take place during water retention? Do we know the effect of dilution on chemical processes? We are familiar with both; we know the chronical water retention in anemia and the fatty degeneration which is caused by it. We have sufficient information concerning the latter, particularly thanks to general chemistry which has come out with the so-called theory of dilution, stating that through digestion all salt is dissociated and brought to greater activity. When the organs become watery and dilute the lymphs, every process in the organism either begins to operate more rapidly, or to produce more generous results. This assumption becomes a certainty when we look at the increased combustion in the organism during fever which has been proved by von Loewy. Using chemical laws as a basis, we can predict that sugar is the first to burn up during

fever so that liver would have to release its glycogen before the processes attack the albumen. If a combustion of albumen or, to be more exact, oxydation of albumen in a diluted solution occurs, the result should be different than with oxydation in a concentrated solution. We are familiar with such a decomposition in a diluted solution; it is the anemic degeneration. Anemia is rich in water, it oxydizes in a diluted solution, and leads to a fatty degeneration of the organs. It remains a question whether the fat stems from carbohydrates or albumen. It is sufficient for us to know that dilution leads to a fatty degeneration. At this point we have reason to believe that in the case of a fatty degeneration during fever, this dilution plays a role. We no longer need any special cell capcities, for the normal process, the life of the cells, is now being disturbed by dilution, and we know that such a dilution leads to fatty degeneration with similar, even though chronic, symptoms: retention of chlorine, loss of phosphorous and nitrogen. Senator's statement that with fever a patient gains fat and looses albumen is an expression of the above process. If the decomposition of the organism produces fat, it means that fat escape decomposition. Additional fat does not help in spite of its high caloric content, and it should not be regarded as a preservative of albumen. Elements which burn up in the dilution should be added, namely, sugar and albumen.

Are we capable of directing the fever process, this dilution, to normal conditions through artificial means? Can we prevent the infiltration of water by increasing the lymph concentration? The organism retains salt on its own. In adding salt, we supply the necessary material. In our experiments we used sodium chloride, calcium phosphate, and a mixture of both, with some successful results. These consisted mainly of sparing nitrogen (decrease in the secretion of nitrogen) and shortening the convalescence period. In our discussion of individual cases we stressed the irregularity of the effect. Sodium chloride is not only a concentration agent, but also a salt capable of creating unknown changes in osmotic pressure. It rinses the organism out, and has a diuretic effect. We do not dare to decide whether or not this is favorable. Neither can we make an accurate evaluation of the duration of this process. At least our experiments have shown that addition salt cannot produce damage. In some cases, a sparing of nitrogen cannot be denied, particularly where the food intake was good. In cases where the nitrogen supply was low, on the other hand, chloride effected an increase in the secretion of nitrogen. We have

witnessed in all the cases an increase in diuresis (particularly through calcium phosphate), a more rapid secretion of chlorine and phosphorous during convalescence (a shorter period of convalescence), and consequently we may assume that the effect of additional salt during fever is similar to that under normal circumstances, and that it may condition a different distribution of water in the organism.

Even though we have failed to find new means of changing or stopping the fever process, we hope that our findings will contribute the more recent experiments on metabolism which deal not only with the supply of calories, but also with lymph concentration.

This work was started in Zurich and finished in Lemberg. I would like to thank the director of the medical clinic in Zurich, professor Eichhorst, and the director of the clinic in Lemberg, professor A. Gluzinski, for furnishing the material and for showing an interest in my experiments.

- END-